

Annotated Bibliography: Illusory Correlation and Related Topics

**This bibliography is slowly being developed. Corrections or additions are welcomed.
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Abramson, L. Y., & Alloy, L. B. (1980). Judgments of contingency: Errors and their implications. *Advances in environmental psychology: General*. Hillsdale, N. J.: Erlbaum.

Acorn, D. A., Hamilton, D. L., & Sherman, S. J. (1988). Generalization of biased perceptions of groups based on illusory correlations. *Social Cognition*, 6, 345-372.

Exp 1's purpose was to see if an IC based on one dimension would influence trait judgments on another dimension. Cell sizes were 16:8:8:4. Three conditions (mixed, social and intellectual) and three dependent variables (trait rating, group assignment and frequency estimation). IC on the manipulated dimension generalized from that dimension to the other. Exp 2 replicated this with different domains.

Adi, H., Karplus, R. Lawson, A., & Pulos. S. (1978). Intellectual development beyond elementary school: VI. Correlational reasoning. *School Science and Mathematics*, 78, 675-683.

Adler, S., Skov, R., & Salvememini, N. (1985). Job characteristics and job satisfaction: When cause becomes consequence. *Organizational Behavior and Human Decision Processes*. 35, 266-278.

Ajzen, I. (1977). Intuitive theories of events and the effect of base-rate information on prediction. *Journal of Personality and Social Psychology*, 35, 303-314.

Not an IC study.

Allan, L. G. (1980). A note on measurements of contingency between two binary variables in judgment tasks. *Bulletin of the Psychonomic Society*, 15, 147-149.

Allan, L. G. (1993). Human contingency judgments: Rule-based or associative? *Psychological Bulletin*, 114, 435-448.

This paper reviews various models of contingency judgment, and concludes that a classical conditioning model is a "useful heuristic for conceptualizing human contingency judgments." That is, the question raised in the title was answered with "associative." The paper does not address IC, and is largely devoted to investigations in which the response is an action, rather than to investigations in which Ss observe passively, though she did mention "described situations" and briefly note that the results were similar to "experienced situations," or trial by trial learning.

Allan, L. G., & Jenkins, H. M. (1980). The judgment of contingency and the nature of the response alternatives. *Canadian Journal of Psychology*, 34, 1-11.

This is an investigation not of IC but rather of the judgment of contingency between a response and an outcome. The nub of the study is whether active responses are differentially effective than non-responses, and it is not really germane to IC.

Allan, L. G., & Jenkins, H. M. (1983). The effect of representations of binary variables on judgment of influence. *Learning and Motivation*, 14, 381-405.

This is not an IC study, but has considerable implications for IC. The essential point of the study is that the representation of the binary variables makes a big difference, in that the presence/absence of a variable matters. That is whether a variable is symmetric or asymmetric matters a great deal. (symmetric variables are those for which both variables have a positive value (male-female) whereas asymmetric

variables are those in which one value is the nonoccurrence of the other. The first two experiments involved a physical response by the subjects, hence is outside the scope of this bibliography. The third involved passive observation, but did not have a zero correlated condition. Allan & Jenkins concluded that the form of representation indeed mattered, and that the subjects judgments were based on Dd, the difference between confirming and disconfirming cases $(A+D) - (B + C)$ rather than on Dp, the difference between conditional probabilities.

Alloy, L. B. (1988). Expectations and situational information as contributors to covariation assessment: A reply to Goddard and Allan. *Psychological Review*, 95, 299-301.

Alloy replies to the critique and says that Goddard and Allan did not understand the Alloy & Tabachnik framework.

Alloy, L. B., & Abramson, L. Y. (1979). Judgments of contingency in depressed and nondepressed students: Sadder but wiser? *Journal of Experimental Psychology: General*, 108, 441-485.

Not an IC study but widely cited in the IC lit. The method is essentially probability learning, and involved predicting what color light would come on by pushing buttons. The authors concluded that nondepressed Ss attended to cells A and D.

Alloy, L. B., & Tabachnik, N. (1984). Assessment of covariation by humans and animals: The joint influence of prior expectations and current situational information. *Psychological Review*, 91, 112-149.

This is a wide-ranging literature review organized by the proposition that "two sources of information are relevant to perceiving the degree of covariation between two events: the situational information about the objective contingency between the events provided by the current environment and the organism's prior expectations or beliefs about the event covariation in question." While both sources are in theory continuous, the review is organized around a 2 X 2 table in which each is conceptualized as a dichotomy. In the cell defined by low current information and low prior expectations, the prediction is that no judgment concerning covariation will be made, or will be made with little confidence. If current information is low but prior expectations are high, a judgment in line with expectations will be made. If current information is high but prior expectations are low, a judgment in line with current information will be made. The high/high cell has 2 cases. If both imply the same covariation or causal attribution, one will be made with extreme confidence. If they conflict, then the person is in a cognitive dilemma and will seek ways out of it.

Much of the rest of the paper provides evidence for the hypotheses entailed in the table, and for the general proposition that "situational information about objective contingencies between events interacts with personal beliefs about event relationships to determine covariation judgments." There are some generalizations made that are especially relevant to the current project. For example, on p. 116, they assert that "Because an expectation about an event covariation is often formed on the basis of previous situational information about the relationship between events, an intriguing implication of our interactional model is that an organism's earliest covariation experiences have a disproportionately large impact on later contingency detection." [This is in stark contrast to Kareev's (1995, p. 268) comment that "limited capacity may also lead to unwarranted hypotheses and even (though infrequently) to incorrect hypotheses: but such hypotheses will soon be refuted by incoming data."]

They also (p. 118) note that "by psychologically eliminating statistically relevant data about nonoccurrences, the behaviorist might actually transform situations in which covariation information is sufficient to make accurate causal inferences into situations in which information is insufficient to do so." (This is exactly what Ss in the dissertations by Hipp and Brant did.)

A comment at the end of the paper (p. 140) foreshadows the arguments made by Gigerenzer and the

ABC group, an mirrors Hammond's emphasis on correspondence vs. coherence. "In determining the relative rationality of an organism's strategies for assessing contingencies, it is important to consider which strategies lead to accuracy over the long run in the organism's everyday environment as well as accuracy over the short run in the laboratory."

Amin, J. M., & Lovibond, P. F. (1997). Dissociations between covariation bias and expectancy bias for fear-relevant stimuli. *Cognition and Emotion*, 11, 273-290.

Es paired fear relevant stimuli with electric shock. Ss moved a dial to record their expectancy of receiving a shock after each slide, answered questions and filled out ratings afterwards. Ss reported greater expectancy of shock during fear relevant stimuli and reported more pairings of fear relevant stimuli and shock at the end of the experiment. They found an interesting dissociation between expectancy ratings as assessed by GSR on line and post experimental covariation assessment. They speculated that the reason is that the covariation measure is intrinsically more abstract and hence influenced by extrinsic sources of information.

Arkes, H. R. (1981). Impediments to accurate clinical judgment and possible ways to minimize their impact. *Journal of Consulting and Clinical Psychology*, 49, 323-330.

Not an empirical paper. Reviews some of the early research on IC, especially with regard to what cells to which people are attending.

Arkes, H. R., & Harkness, A. R. (1983). Estimates of contingency between two dichotomous variables. *Journal of Experimental Psychology: General*, 112, 117-135.

Useful review in the Intro.

Exp 1

AC rather than IC study. Used f in .50s. Manipulated Cell A frequency by manipulating labels. Estimates of contingency did not increase with Cell A frequency. When Cell A frequency was very low, contingency estimates were high. A & H speculated that something like a von Restorff effect might have led to overestimation of the proportion of observations in Cell A.

Exp 2

AC rather than IC study. Used f in .50s. Cell A kept constant but other cells increased, and Es asked Ss to estimate cell frequencies from memory. Got overestimation of Cell A.

Exp 3

Replicated exp 2 with different content and different frequencies.

Exp 4

Varied f across 7 tables. Ss had all data in front of them when judging contingency. DV was "related or not." The point of the study was to present Ss with 7 different contingency tables designed so that the dominant heuristic could be inferred. Few Ss were consistent in using a single heuristic, but the dominant one was sum of diagonals. The results are not presented in such a way that IC could be inferred for the two $f = 0$ tables.

Exp 5

Similar to exp 5 but pictures instead of words were used and memory load was reintroduced. Strategies were Cell A (N = 13), A-B (10), sum of diagonals (5) conditional probability (5). When Ss were forced to remember the cells' frequencies they used heuristics much simpler than when the matrices were in full view. Major individual differences not only as just described, but also in that there were unclassifiables Ss.

Exp 6

This study had $f = 0$. Cells B and (separately) C were made salient by using red ink instead of blue, the color of the other cells. The salience of Cell C had no effect; Cell B did. Hence Cell C is seen as irrelevant. Manipulations of salience do not play a logical role in AC. Found strong degree of IC.

Exp 7

Found strong degree of IC. Found that entries in Cell D actually decreases contingency estimates. Ss who kept a running estimate of contingency made higher final estimates.

General Discussion

Factors influencing AC: framing, memory load, salience, method of estimation & others have shown wording of request, hedonic impact. A search for the heuristic that people use [in assessing contingency] will be a futile search." (p. 132)

Arkes, H. R., & Rothbart, M. (1985). Memory, retrieval, and contingency judgments. *Journal of Personality and Social Psychology*, 49, 598-606.

Showed that the nature of the retrieval cue affected the contingency judgment. Exp 1 used 4 different matrices, all with 0 r values based on variants of 4:2:2:1 ratios of cell frequencies, but the dependent variables were not typical IC measures, but essentially queries about a row or column. Exp 2 gave Ss mock newspaper stories about schoolchildren, and asked Ss which group was doing better. The normative answer was cannot tell, but the Ss answered based on which row of the implicit 2X2 table had been cued by the mock article.

The generalization is restricted to 2X2 tables with unequal marginals.

Baron, R. S., Inman, M. L., Kao, C.F., & Logan, H. (1992). Negative emotion and superficial social processing. *Motivation and emotion*, 16, 323-346.

Study 1

48 patients waiting in dentistry clinic took anxiety scale (mean age = 43) then heard 24 sentences with statement that were occupationally relevant, irrelevant or neutral. Significant tendency for Ss to report that stereotype consistent adjectives were more frequent than stereotype inconsistent ones. The effect was more pronounced for high anxiety Ss.

Study 2 - not relevant

Basow, S. A., Smither, J. W., Rupert, L., & Collins, H. The effect of satisfaction and gender on self-evaluations of task performance. *Sex Roles*, 20, 413-427.

Not an IC study in the usual sense at all. The authors use the term, but idiosyncratically.

Beach, L. R., & Scopp, T. S. (1966). Inferences about correlations. *Psychonomic Science*, 6, 253-254.

Berman, J. S., & Kenny, D. A. (1976). Correlational bias in observer ratings. *Journal of Personality and Social Psychology*, 34, 263-273.

Not a typical IC study, but there was a sort of zero correlation condition, with only a couple of observations. In a within design, Es obtained trait ratings on 9 trait pairs, 3 positive, 3 zero and 3 negative. Another group of Ss observed 16 pairs (twice) with levels of the traits such that the correlations in the data were positive, zero and negative, yielding 9 combinations of assumed and actual correlation. Ss were then asked to recall the values assigned to the named hypothetical individuals. Ss' assumed correlations significantly influenced their recall of the trait ratings presented to them.

Berndsen, M., McGarty, C., van der Pligt, J., & Spears, R. Meaning-seeking in the illusory correlation paradigm: The active role of participants in the categorization process. *British Journal of Social Psychology*, 40, 209-234.

Exp 1 presents a radical departure from the traditional paradigm, in that the matrices were incomplete. The "behavior constrained" group had cells A=24 and B=12, but no information at all about C or D. The group constrained" group had A=24 and C=12, but no information about B or D. The Ss were asked to estimate of how many behaviors of of 36 for group A and 18 for group B would be v and how many undesirable for both groups. Ss were also given new statements, and asked to assign them to the two groups. Subjects created ICs out of whole cloth. The authors concluded that "incomplete information about groups and their behaviours can produce biased covariation judgments. Perceiving more positive than negative behaviors in a single group ... seems sufficient to conclude that the other group is relatively bad..."

Exp 2 is a small n study using a think-aloud protocol procedure with complete 2X2 matrices. The authors concluded that "evaluative reinterpretations and the search for intergroup differentiation start during the presentation of the statements in the standard paradigm.... Looking for confirming evidence leads to the perception of illusory correlation, while focusing on disconfirming evidence produced no (or negative) illusory correlation."

The basic point is that "imposing sense on the stimulus situation can lead to illusory correlation. This kind of meaning enhancement can be considered as understandable and rational in the context of the illusory correlation task."

Berndsen, M., & Spears, R. (1997). Reinterpreting illusory correlation: From biased covariation to meaningful categorization. *Swiss Journal of Psychology*, 56, 127-138.

Not an experimental study. The authors explore several of their own published studies. They accept the reality of IC, but conclude that "if the illusory correlation effect is considered as a product of meaning enhancement based on rational expectations and real contrasts in the data, then it can be seen as sensible and rational rather than biased." Whereas Lieberman (1999) asserted that time pressure ought to decrease IC, Berndsen et al. say that they eliminated IC with a higher level of load/pace.

Berndsen, M., Spears, R., McGarty, C., & van der Pligt, J. (1998). Dynamics of differentiation: Similarity as the precursor and product of stereotype formation. *Journal of Personality and Social Psychology*, 74, 1451-1463.

Berndsen, M., Spears, R., & van der Pligt, J. (1996). Illusory correlation and attitude-based vested interest. *European Journal of Social Psychology*, 26, 247-264.

This is one of a series of studies partially aimed at showing that IC is "rational and sensible," and a "process of meaningful categorical differentiation in which people use features of the data, the

instructions and their expectations to make sense of the task."

Exp 1 showed that getting subjects to expect less group cohesiveness led to no IC, on the average. Exp 2 showed that manipulating group size, thereby varying the salience of the group, led to variations in IC. They concluded that the results of exp1 could not be explained by Fiedler's or Smith's models, and that the two experiments together called for revision of Hamilton & Gifford's explanation of paired distinctiveness illusory correlations. They further argued that paired distinctiveness illusory correlations were at least partly due to expectancies, and that the two forms of IC were not so different as had been assumed.

Berndsen, M., Spears, R., McGarty, C., & van der Pligt, J. (1998). Dynamics of differentiation: Similarity as the precursor and product of stereotype formation. *Journal of Personality and Social Psychology*, 74, 1451-1463

Study 1 manipulated data-based coherence, expectation-based coherence, reinterpretation scope and position of the rating task. The array was 16:8:8:4. Reduced intragroup differences led to more pronounced IC and increased judgments of coherence. Expected coherence and reinterpretation scope also increased IC. The position results suggested that IC is developed and strengthened over the course of the experiment.

Study 2 was designed to resolve an inconsistency between the study 1 finding that coherence enhanced IC and Hamilton & Sherman's (1996) result that coherence led to on-line processing which in turn attenuated IC. There were 3 conditions of data structure, varying in coherence (weak, moderate, strong), but all had $f = 0$. The results revealed the expected quadratic trend between coherence and IC, with a significant IC (but a very weak one) only in the moderate coherence condition.

Concluded that IC may at least in part arise through an attempt to meaningfully differentiate between two groups, but that other factors also play a part (distinctiveness, memory, information-loss), and that expectation-based and data-based IC are similar in that both elicit expectations of similarities and differences.

Berndsen, M., Spears, R., & van der Pligt, J. (1996). Illusory correlation and attitude-based vested interest. *European Journal of Social Psychology*, 26, 247-264.

Manipulated vested interests in a study concerning the possible introduction of English as the language of instruction in two Dutch universities. In Experiment 1, there were 28 + and 20- statements, and Ss had to guess from which of 2 universities the student making each statement had come. Hence this was not a typical IC paradigm, given the classification by Ss rather than by Es on one dimension. On both an assignment task and a frequency estimation task, significant IC effects were obtained for opponents.

Experiment 2 was a standard IC study, meant to reduce the IC effect in Exp 1 by giving the Ss explicit disconfirming data. Again, there were significant IC effects for opponents but not for supporters of the introduction of English. The prediction that IC effects would be attenuated was not upheld.

Berndsen, M., Spears, R., van der Pligt, J., & McGarty, C. (1999). Determinants of intergroup differentiation in the illusory correlation task. *British Journal of Psychology*, 90, 201-220.

Berndsen, M., van der Pligt, J., Spears, R., & McGarty, C. (1996). Expectation-based and data-based illusory correlation: The effects of confirming vs. disconfirming evidence. *European Journal of Social Psychology*, 26, 899-913.

Manipulated expectation and task order in a 2X2 design. Not a standard IC paradigm, in that Ss were not presented with an array of co-occurrences, except in a rating task, in which the data structure was 16:8:8:4. The IC in the expectancy - then rate condition was .58. IC decreased when the expectation

about the negative behaviors in group B was contradicted by the empirical data. There was no IC in the absence of expectancies, unless the ratings were done first, allowing Ss to try to differentiate the groups.

Beyth-Marom, R. (1982). Perception of correlation reexamined. *memory and Cognition*, 10, 511-519.

Not a typical IC study, in that the DV was choice among sentences describing correlation. The author surveyed the literature and concluded that variability in the results of the research was due to 1. type of data presentation (serial vs tabular), 2. instructions, and 3. symmetry vs asymmetry. Symmetric relations are those in which both levels of a variable refer to positive features (male - female) whereas asymmetric relations are those in which a negation is one of the levels (disease present vs. disease absent). In 3 experiments, Beyth-Marom found that Ss in asymmetric conditions interpret the perception of relationship in a more narrow way than Ss in symmetric conditions.

Billman, D., Bornstein, B, & Richards, J. (1992). Effects of expectancy on assessing covariation in data: "Prior belief" versus "meaning." *Organizational Behavior and Human Decision Processes*. 53, 74-88.

This was not a typical illusory correlation study, but it did present subjects with zero correlated arrays. Ss were 48 paid undergraduates. The study had four types of prior beliefs (positive r, negative r, don't know and zero r) in a factorial design with three levels of sample r (based on 15 pairs). Subjects were presented pairs of arrays, one pair having $r = 0$, the other $r =$ either $-.5$ or $+.5$. In one condition, the subjects made forced choice as to which of the pair was more highly correlated, in the other they rated both as to how strongly each was related on a 0 to 100 point scale, then stated the direction of relation, if appropriate. Results showed a general biasing effect of prior belief, such that the specific nature of Prior Belief whether positive, negative, or zero - shifted subjects' evaluations of the data in the corresponding direction. Subjects' judgments were also appropriately influenced by the relation objectively present in the data."

The overall forced judgment performance was "modest," with 60% correct when 50% was chance. Performance was by far the best (73% correct) when subjects' prior belief was that there was no relation in the data.

The zero correlated arrays were always contrasted with arrays that were either positively or negatively correlated, hence the tie to illusory correlation is tenuous. When subjects rated zero correlated data their mean ratings were consistent with their prior beliefs, but there was considerable variation in the ratings. (Note: there is a contradiction in the labeling of Table 2 and Figure 1.)

Block, J. (1977). An illusory interpretation of the first factor of the MMPI: A reply to Shweder. *Journal of Consulting and Clinical Psychology*, 45, 930-935.

Bobko, P., & Karren, R. (1979). The perception of Pearson product moment correlations from bivariate scatterplots. *Personnel Psychology*, 32, 313-325.

The investigators sent questionnaires consisting of 13 scatterplots to 200 members of Div 5 of the APA, asking them to estimate r to 2 places. Eight standard, unlabeled scatterplots had r values ranging from $-.64$, with 100 points thereon. Two scatterplots reflected the slopes around the 45_ axis, and other scatterplots, and others had outliers, a "twisted pear shape," or the middle of the distribution removed. Subjects generally underestimated correlations, especially with small to moderate (.2 to .6) r values. Values below .2 are seen as reflecting no relationship at all. Other effects are noted, and implications for courtroom practice briefly explored.

Boggiano, A. K., Barrett, M., Weiher, A. W., McClelland, G. H., et al. (1987) Use of the maximal-operand principle to motivate children's intrinsic interest. *Journal of Personality and Social*

Psychology, 53, 866-879.

The basic hypothesis of this paper was that in contrast to research that shows that intrinsic interest in academic pursuits is diminished by rewards (the minimal sufficiency principle) adults see tangible rewards as enhancing intrinsic interest (i. e., they adhere to a maximal operant principle). Six studies were run, studies 5 and 6 using an IC paradigm.

Experiment 5

125 Intro Psych students were served in a 2 X 2 design, with 2 levels of relation ($r = .00$ and $r = -.55$) and 2 levels of 2 levels of content (academic vs. control). The Es expected an IC between perceived rewards and perceived intrinsic enjoyment with the academic content, but not the control condition (running long distances and using appliances).

Ss were first shown 8 events for a sample problem, cloud seeding and rain, and asked to respond on a -100 to +100 scale of relation. The Ss in the $r = .00$ condition had 30 observations from a 3 X 3 matrix (no, small and large rewards and increases in interest). The dv was the 201 point scale described above, divided by 100. The mean judgment was significantly higher for the academic than for the control judgments, .75 vs. .39. The mean judgment for the $r = .00$ condition was .77, but it was also very high (.75) for the $r = -.55$ condition. 23 additional Ss were run with X and Y as the variable names. The $r = -.55$ Ss had lower judgments than the $r = .00$ Ss, -.37 vs. -.02. That is, with no prior beliefs no IC was found. [I believe that the lack of prior beliefs is not sufficient for IC not to occur, as the Es themselves speculated about their basic control condition. That is, beliefs about relationships may be formed during the study if the stimuli are rich enough to permit it.]

Experiment 6

In this study, the Es contrasted the effects of perceived reward on academic with prosocial behaviors, and changed the valence of the interest levels to include a decrease in interest. In other words, the procedure was as in exp 5. Beliefs about the effect of rewards was significantly greater for the academic domain than for the prosocial (.26 vs. -.13), averaged over $r = .00$ and $r = -.55$ conditions. The Ss in the academic domain perceived a positive relation (.30) even when the data were such that $r = -.55$.

Boynton, D. M., Smith, L. D., & Stubbs, D. A. (1997). Sensitivity and bias in covariation detection: A direct approach to a tangled issue: *Organizational Behavior and Human Decision Processes*. 72, 79-98. N = 24 students who participated in a 3 X 6 factorial, completely within design, each cell calling for Yes/No responses and confidence judgments concerning whether or not there was a correlation between 15 pairs of lines. There were 6 levels of population correlation for the SN trials, and three levels of prior probability. The proportion of Yes responses increased approximately linearly with the sample r , and increased with prior probability. Sensitivity increased with the population correlation for the SN trials, but bias did not affect sensitivity.

Correlations of $r < .30$ "were not reliably distinguished from an uncorrelated population."

Note that these are discriminative responses; what would the value corresponding to .30 be for an absolute judgment, as in an IC paradigm?

Bozzolo, A. M., & Brock, T. C. (1994). Toward a universal paradigm for examining processing of brand information: An application of illusory correlation theory. In B. G. Englis (Ed.), Global and multinational advertising. Need city & publisher

Brant, C. R. (1997). Information selection and judgments about sexism. Unpublished doctoral

dissertation, Bowling Green State University.

Brant's dissertation addressed three questions: 1. What information do participants believe are related to their judgments that a particular male is a sexist? 2. What is the relation between objective and subjective correlation, when the sample correlation is positive zero and negative? 3. What is the relation between subject variables and judgments of sexism. We focus on no. 2. Ss were 61 undergrads. There were three conditions determined by the value of f , $f = .00$, $-.30$ and $+.30$. These values were accomplished by having ratios of A:B:C:D of 20:20:20:20, 14:26:26:14, and 26:14:14:26. Ss saw 80 statements made by a hypothetical person on a computer. Cell A were negative statements made to a female (i.e., consistent with a positive hypothesis of sexism), etc. They were instructed that their job was to determine if the person making the 80 statements was a sexist. As they observed each statement, they instructed the computer whether or not to save the statement. When all 80 statements had been responded to, the subjects saw a summary of what they had saved. The frequencies of behaviors saved varied between conditions. The results for the IC condition are of direct interest here, and the pattern in that condition was $A > B > C > D$, with A being 3 times greater than C. The simplest classification of strategies was to look at the cell highest proportion of statements saved. Cell A was the predominant cell for 42 of the 60 Ss. The remaining data were 4 for A&B, 4 for C, 8 for B, 1 for A&B&D, and 1 who saved no statements. In the zero f condition, 6 of the 20 Ss reported that they thought the person was a sexist. Individuals who saw a relationship tended to select more confirmatory data (cells A and D) than disconfirmatory data (cells B and C).

Note that when f coefficients are calculated from the saved data, the values vary widely. The strong tendency of many subjects to ignore cell D makes many of the resulting values negative. This operation does not appear to be a good way to assess subjective f . It is, however, a direct way to assess subjective cell importance.

Brant, C. R., Foos, A., Gilman, T., Glew, K., Riffle, M., & Snyder, D. (1999, May). "Did he really do that?" Judgments of sexism: The "smoking gun". Paper presented at the annual meeting of the Midwestern Psychological Association, Chicago.

Brennan, J. H., & Hemsley, D. R. (1984). Illusory correlations in paranoid and non-paranoid schizophrenia. *British Journal of Clinical Psychology*, 23, 225-226.

Brown, R., & Smith, A. (1989). Perceptions of and by minority groups: The case of women in academia. *European Journal of Social Psychology*, 19, 61-75.

This is not an IC study in the usual sense, though the authors label it as such. A questionnaire was distributed to faculty members, and the perceived correlation between gender and seniority in the university was lower than it was in reality. Hence this is more like illusory non-correlation than illusory correlation.

Busemeyer, J. R. (1990). Intuitive statistical estimation. In N. H. Anderson (Ed.), *Contributions to information integration theory, Vol. 1: Cognition*. Hillsdale, NJ: Lawrence Erlbaum Associates. pp. 226-212. Jerry briefly reviews the literature, and takes the position that the standard means of diagnosing the models used by Ss to infer covariation are inadequate, and that the averaging model is the answer. (Note, though, that its use in this context would require accepting H_0 .) He proposes several hypotheses to account for IC, each of which depends on prior biases. The most interesting one to me is that "prior beliefs bias the sampling process" (p. 211).

Bush, D. S. (1983). The illusory correlation phenomenon revisited: A new hypothesis. *Dissertation Abstracts International Vol 43(12-B) 4137*.

Camerer, C. (1988). Illusory correlations in perceptions and predictions of organizational traits.

Journal of Behavioral Decision Making, 1, 77-94.

Not a typical IC study. Camerer tested the hypothesis that organizational traits might reflect illusory correlations. He had 7 management students read 5 Fortune magazine articles and give memory-based ratings for each of 8 traits theory based, then state whether they thought the 8 traits were +, - or zero correlated. 19 other management students and 7 undergraduate poetry students made similarity ratings of the same 8 traits. The theory predicted the stated correlations, but not the memory based ones. The correlation in the actual stimulus materials was not ascertainable, given his method.

Casas, J. M., Brady, S., & Ponterotto, J. G. (1983). Sexual preference biases in counseling: An information processing approach. Journal of Counseling Psychology, 30, 139-145.

Not an IC paradigm. Ss were 34 mental health professionals. Stimulus materials paired a description of a student in terms of gender and sexual preference with one of two characteristics which were either congruent or incongruent with the stereotype, shown on cards. Ss saw 48 cards, but the correlations among the groups represented and the characteristics was not zero. The investigators were looking to see if the associations corresponded to the stereotypes by looking at the errors made in assigning group membership to characteristics. "An error was scored if the subject responded that a student who was monogamous was a heterosexual male because, in fact, monogamy on the stimulus cards was associated more often with gay men than with heterosexual women." (This appears to me to two errors, both gender and orientation?) Subjects made fewer errors with stereotype-congruent information than with incongruent information, and fewer errors with homosexuals than gays. Hence mental health professionals are influenced by stereotypes, as measured by what the authors called illusory correlation.

Chadwick, P., & Taylor, G. (2000). Are deluded people unusually prone to illusory correlation? Behavior Modification, 24, 130-141.

Ss were outpatients, including 10 people with major depression, 9 paranoid schizophrenics, and 8 non-paranoid schizophrenics. Materials were Chapman's (1967) original word pairs, and the DV was the % of time Ss reported that word pairs appeared. There were no between group differences. No analyses are reported as to the values of IC, but the table of proportions shows many higher than would be expected by chance.

Chapman, L. J. (1967). Illusory correlation in observational report. Journal of Verbal Learning and Verbal Behavior, 6, 151-155. In this paper Chapman proposed and defined the term IC. The experiment was a verbal learning study, in which Chapman showed that words that were associatively connected tended to be perceived as being statistically associated, even though they had been randomly paired. Words that were distinctive (line length) also were reported as having been paired more often than they had been. So, from the very beginning, association and distinctiveness have been implicated in IC.

Chapman, L. J., & Chapman, J. P. (1967). Genesis of popular but erroneous psychodiagnostic observations. Journal of Abnormal Psychology, 73, 193-204.

Experiment #1

Purpose: See if naive Ss would make same incorrect judgments as clinicians, even though Ss had seen only stimulus materials with no correlation.

Subjects: 108 Intro Psych students

Task: Examine 45 drawings paired orthogonally with symptoms, then state what sorts of drawing people with given symptoms are likely to make

Dependent variable: state what sorts of drawing people with given symptoms are likely to make

Measure of IC: Co-occurrence in reports of symptoms and signs.

So What? Es proposed that the cause of IC was associative connections between signs and symptoms.

Experiment # 2

Purpose: See if naive Ss with repeated experience with stimuli would still make same incorrect judgments as clinicians, even though Ss had seen only stimulus materials with no correlation.

Subjects: 56 Intro Psych students

Task: Examine 45 drawings paired orthogonally with symptoms, then state what sorts of drawing people with given symptoms are likely to make. Same as exp 1 except that stimuli were examined on 3 successive days

Dependent variable: state what sorts of drawing people with given symptoms are likely to make

Measure of IC: Co-occurrence in reports of symptoms and signs.

So What? Repeated exposure does not diminish IC

Experiment # 3

Purpose: See if naive Ss would still make same incorrect judgments as clinicians, even though Ss had never seen stimulus materials

Subjects: 44 Intro Psych students

Task: Have DAP explained, then state ...

Dependent variable: state what sorts of drawing people with given symptoms are likely to make

Measure of IC: Co-occurrence in reports of symptoms and signs.

So What? prior expectations implicated in IC

Experiment # 4

Purpose: See if naive Ss would still make same incorrect judgments as clinicians, even though stimulus materials now had negative correlations between highly associated pairs of signs and symptoms

Subjects: 38 Intro Psych students

Task: negative correlations between highly associated pairs of signs and symptoms

Dependent variable: state what sorts of drawing people with given symptoms are likely to make

Measure of IC: Co-occurrence in reports of symptoms and signs.

So What? Reports of IC diminished, but showed "surprisingly strong survival in the face of negative evidence."

Experiment # 5

Purpose: See if naive Ss would still make same incorrect judgments as clinicians, with a \$20 incentive and with more time to examine materials.

Subjects: 41 Intro Psych and advanced undergrad Psych students

Task: Same as in Exp 1 but now a \$20 prize was offered for the most accurate judgments.

Dependent variable: state what sorts of drawing people with given symptoms are likely to make. What % of patients would make show the signs.

Measure of IC: Co-occurrence in reports of symptoms and signs.

So What? Lack of motivation or lack of time to look at drawings not the explanation for IC.

Experiment # 6

Purpose: See if IC would persist under conditions designed to facilitate accuracy. Ss could shuffle, resort and rearrange the cards, use paper & pencil, etc.

Subjects: 42 Intro Psych and advanced undergrad Psych students

Task: Same as in Exp 1 but now a \$20 prize was offered for the most accurate judgments.

Dependent variable: state what sorts of drawing people with given symptoms are likely to make. What % of patients would make show the signs.

Measure of IC: Co-occurrence in reports of symptoms and signs.

So What? Lack of motivation or lack of time to look at drawings not the explanation for IC.

Chapman, L. J., & Chapman, J. P. (1969). Illusory correlation as an obstacle to the use of valid psychodiagnostic signs. *Journal of Abnormal Psychology*, 74, 271-280.

Elegant studies using Rorschach-like stimuli.

Exp 1

32 practicing clinicians reported invalid signs and failed to report valid signs of homosexuality. A rating study showed that the invalid signs had a high verbal associative relationships with male homosexuality.

Exp 2

Naive Ss reported the presence of the same invalid signs based on associative connections even though they were zero correlated with homosexuality, and even though valid signs were also available, though zero correlated.

Exp 3

Naive Ss reported the presence of the same invalid signs based on associative connections even though they were zero correlated with homosexuality, and even though valid signs were also available and actually correlated in the data.

Exp 4

The invalid signs were removed from the stimuli and the positive correlations retained for the valid signs. The naive Ss now reported the valid signs. When the positive correlations were removed, the valid signs were no longer reported.

Chapman, L. J., & Chapman, J. P. (1975). The basis of illusory correlation. *Journal of Abnormal Psychology*, 84, 574-575.

This is a brief paper dismissing as irrelevant a criticism by Rosen that the popular invalid correlates had higher associative connections (associative homogeneity) to their category label. I don't see the relevance of Rosen's critique, either.

Chapman, G. B., & Robbins, S. J. (1990). Cue interaction in contingency judgment. *Memory and Cognition*, 18, 537-545.

Cheng, P. W., & Novick, L. R. (1992). Covariation in natural causal induction. *Psychological Review*, 99, 365-382.

Chun, W., & Lee, H. (1999). Effects of the difference in the amount of group preferential information on illusory correlation. *Personality and Social Psychology Bulletin*, 25, 1463-1475.

Reports three IC experiments using the paired distinctiveness procedure, but concludes that it is not paired distinctiveness that mediates IC but the difference in the amount of + and - information between groups.

Exp 1

Compared two groups with common ratios but differential differences, 16:8:8:4 and 4:2:21. Using typical DVs (impression ratings, cued recall and frequency estimates), they found IC only for the 16:8:8:4 group. The largest mean IC was for 16:8:8:4 with frequency estimation, $f = .31$.

Exp 2

Compared high (rehearse an 8 digit number) vs. low cognitive load using only the 4:2:21 stimulus set. Found no group differences, but did find a significant $f = .15$ in one condition, low load with frequency estimation. The low load condition appears to be identical with the "small" condition in exp 1, but the results are rather different.

Exp 3

Very unusual study in that Ss rated either Group A or Group B, but not both. The stimuli were presented only as a summary table. The results of the impression ratings were IC like, in that the target group received higher ratings.

The authors see their results as ruling out several explanations of IC, including regression to the mean,

paired distinctiveness, mere exposure, memory loss, and the tendency to make meaningful differentiations between groups. They conclude that "the difference in the amount of group preferential information serves as a minimal requirement in the formation of differential impressions of groups."

Cleveland, W. S., Diaconis, P., & McGill, R. (1982). Variables on scatterplots look more highly correlated when the scales are increased. *Science*, 216, 1138-1141.

Colburn, M. S. (1980). An investigation of the effect of alternative hypothesis training on the illusory correlation phenomenon. *Dissertation Abstracts International Vol 41(4-A) 1481.*

Cordray, d. S., & Shaw, J. I. (1978). An empirical test of the covariation analysis in causal attribution. *Journal of Experimental Social Psychology*, 14, 280-290.

Crawley, D. M., & Regan, D. T. (1984). Illusory correlation and stereotype formation: Replication and extension. Paper presented at the annual meeting of the American Psychological Association, Toronto, Ontario. (Cited in Mullen & Johnsen, 1990).

Crocker, J. (1981). Judgment of covariation by social perceivers. *Psychological Bulletin*, 90, 272-292.

A classic paper extensively reviewing the literature and laying out an analysis of the steps involved in inferring covariation.

Crocker, J. (1982). Biased questions in judgment of covariation studies. *Personality and Social Psychology Bulletin*, 8, 214-220.

Two contents - no difference. Varied instructions to see if instructions influenced data selection. Ss were asked to identify what information was necessary and sufficient to make an accurate judgment." Instructions made a difference, but across instructional set, the a>b>c>d ordering was maintained.

Cunningham, M. D., & Reidy, T. J., (1999). Don't confuse me with the facts: Common errors in violence assessment at capital sentencing. *Criminal Justice and Behavior*, 26, 20-43.

Not an empirical study. Simply warns against "susceptibility to illusory correlation" and describes some counterintuitive beliefs about risk. No real tie to IC is made.

Dawes, R. M. (1989). Experience and validity of clinical judgment: The illusory correlation. *Behavioral Sciences and the Law*, 7, 457-467.

Not an empirical study. The title refers to Dawes' conclusion that the belief that there is a correlation between clinical experience and the validity of clinical judgment is, in light of the evidence that there is no correlation at all, an illusory correlation.

de Jong, P. J. (1993). Covariation bias in phobia: Mere resistance to to preexperimental expectancies? *Behavior Therapy*, 24, 447-454.

de Jong, P. J., & Merckelbach, H. (1991). Covariation bias and electrodermal responding in spider phobics before and after behavioral treatment. *Behavior Research and Therapy*, 29, 307-314.

Check volume

de Jong, P. J., & Merckelbach, H. (1993). Covariation bias, classical conditioning, and phobic fear. *Integrative Physiological & Behavioral Science*, 28, 167-160.

de Jong, P. J., Merckelbach, H., & Arntz, A.(1990). Illusory correlation, on-line probability estimates and electrodermal responding in a (quasi)-conditioning paradigm. *Biological*

Psychology, 31, 201-212.

de Jong, P. J., Merckelbach, H. & Arntz, A. (1995). Covariation bias in phobic women: The relationship between a priori expectancy, on-line expectancy, autonomic responding, and a posteriori contingency judgment. *Journal of Abnormal Psychology, 104, 55-62.*

Randomly assigned 40 female spider phobic to treatment and non treatment groups, then paired shock/no shock randomly with 3 kinds of pictures, irrelevant, threatening-non spider, and spider. Untreated women overestimated spider-shock association. Found positive rs between on-line expectancies, a posteriori contingency estimates and electrodermal responding. Spider phobics overestimated the degree of relationship between spider slides and shock presentation. Used equal probabilities of association with a 3X2 data structure. Concluded that the data "underscores the close relationship between on-line processes and the covariation bias phenomenon."

de Jong, P. J., Merckelbach, H., Arntz, A., & Nijman, H. (1992). Covariation detection in treated and untreated spider phobics. *Journal of Abnormal Psychology, 101, 724-727.*

Also used equal probabilities of association with a 3X2 data structure, using more neutral slides as stimuli. Replicated de Jong, Merckelbach, & Arntz (1995).

de Jong, P. J., Merckelbach, H., Boegels, S., & Kindt, M. (1998). Illusory correlation and social anxiety. *Behavior Research and Therapy, 36, 1063-1073.*

de la Haye, A. (1996). Measuring the illusory correlation phenomenon: Should we use the mean phi index? *Current Psychology of Cognition, 15, 353-367.*

de la Haye shows that if the marginals are fixed and unequal, then the distribution of possible correlations for phi correlations that are "incompatible" is different from that for correlations that are "compatible." By compatible she means that the largest cell frequency is consistent with the largest marginal. Given this imbalance, she concludes that it is not appropriate to set $\phi = 0$ under H_0 . The method section lacks key details. She concludes that the "finding that incompatible correlations are relatively difficult to produce is consistent with McGarty et al.'s' (1993) interpretation of the illusory correlation effect as resulting from an active sense-making process."

de la Haye, A., & Lauvergeon, G. (1991). Processus de memoire dans la formation des correlations illusoirs. *Psychologie Francaise, 36, 67-77.*

de la Haye, A. (1997). The effect of marginal distributions on recognition of contingency and non-contingency. *Current Psychology of Cognition, 16, 555-583.*

"The main goal of this experiment was to test whether or not it is especially difficult to detect noncontingency when both margins are uneven." The study used binary, noncausal, symmetric variables with sequential presentation. The author presents converging evidence in the intro that as the two marginal frequencies each depart from equality, the judgment of contingency and noncontingency become more difficult. incomplete - need 4 pages of ms.

DeNisi, A. S., Cafferty, T. P., & Meglino, B. M. (1984). A cognitive view of the performance appraisal process: A model and research proposition. *Organizational Behavior and Human Performance, 33, 360-396.*

DiBattista, D., & Shepard, M. (1993). Primary school teachers' beliefs and advice to parents concerning sugar consumption and activity in children. *Psychological Reports, 72, 47-55.* Not an IC study. They use the term IC only as referring to the tendency of people noticing events congruent with false beliefs.

Dollinger, S. J., Greening, L., & Radtke, R. C. (2001). Reading too much between the lines: Illusory correlation and the word association implications test. *Personality & Individual Differences*, 30, 799-808.

Doherty, M. E., & Falgout, K. (1985, November). Subjects' data selection strategies for assessing covariation. Paper presented at the annual meeting of the Psychonomic Society, Boston.

The studies reported at the conference are subsumed in Doherty, Falgout, Whalen & Zirkler, 1988).

Doherty, M. E., Falgout, K., Whalen, M., & Zirkler, D. (1988). Subjects' data selection strategies for assessing covariation. Unpublished manuscript, Bowling Green State University.

Four studies were presented. In all studies, Ss were presented multiple instances of statements, each of which corresponded to a cell in a 2X2 table. The content of the cover stories in exps 1, 2 and 3 was the possible causal relation between cloud seeding and rain.

Experiment 1

The idea was to bypass steps 2, 3 and 4 of Crocker's (1981) 5 steps. 25 intro psych students observed hypothetical weather bureau records for 100 days, specifically whether the clouds had been seeded or not and whether it had rained or not. The data structure was 23:23:23:23, with 4 days on which the seeding data were missing and 4 on which the rain data were missing. These 8 days were included to provide irrelevant data to reduce demand characteristics. (When Gernot Kleiter subsequently visited the department, we learned that these data were in fact relevant, in that they had to be counted for optimal assessment of the base rates - see Kleiter, Krebs, Doherty, Garavan, Chadwick, R., & Brake G. 1997 for a proof). The study employed a selection paradigm. The Ss instructed the computer whether or not to save each day's data for subsequent inspection. After seeing the summary for the saved data, the Ss made a yes/no covariation judgment and explained their reasoning. The modal save pattern (N = 16) was cells A and C. Only 2 Ss had an ABCD pattern. Fully 22 of the Ss did not meet the save criterion for cell D. We used a criterion of 60% of the data saved to assert that the Ss had saved the data in that cell. Only 3 Ss (12%) reported a relationship. There was no strong prior bias, as almost none of the Ss had heard of cloud seeding.

Experiment 2

This was a replication of exp 1, except that no SAVE operation was used. This replication was done to assess the reactivity of the novel SAVE operation. That is, this was a reception paradigm. Four Ss (16%) indicated that they thought there was a causal relationship between cloud seeding and rain. When exp 1 was described, most Ss reported that they would have kept only the cause present cells.

Experiment 3

30 Ss were split into two groups of 15, SAVE and NO SAVE. The base rate of rain was raised so that the data structure was 31:31:15:15 with 8 additional incomplete records. The rate of illusory correlation increased to 40% in both conditions. The data pattern differed from exp 1, but again there was marked individual differences and marked intra-individual regularity. The modal SAVE pattern (N = 6) was ABC, and only one S saved criterial data in cell D.

Experiment 4

Experiment 4 introduced a moderate prior bias by making the cover story the relationship between job

satisfaction and employee productivity. 25 Ss were in the SAVE group and 26 in the NO SAVE group. Each S saw the records of 100 (20:20:20:20 with 20 incomplete observations) hypothetical employees. The NO SAVE condition differed in this study, in that the Ss responded with a YES/NO key press as to whether they thought the record was relevant, but with no expectation that a summary would later be shown (none was). The percentages of Ss asserting a relationship were 50% and 30% for the SAVE and NO SAVE groups, respectively. A higher % of Ss had ABCD patterns in this exp than in the first 3, 20% and 35% in the SAVE and NO SAVE groups, respectively.

Across all 4 exps 12% of the 131 Ss saved the normative ABCD pattern, 60% saved patterns including cell A, and only 21% saved patterns including cell D.

Dowling, J. F., & Graham, J. R. (1976) Illusory correlation and the MMPI. *Journal of Personality Assessment*, 40, 531-565.

Exp 1 had 28 undergraduate and 26 graduate students in clinical psychology observe 100 items with 10 MMPI scale names randomly paired with two of 10 behavioral descriptions, then indicate which three MMPI scales were most often associated with each of the 10 behavioral description. Undergraduate students showed IC for 6 of 10 statement; graduate students for 9 of 10, which the authors called "massive amounts of illusory correlation." Exp 2 checked the degree of semantic association between the behavioral statements and the MMPI scale names. The authors concluded that exp 2 "seems to indicate that semantic association was an important factor in the production of illusory correlations."

Earl, W. L. (1988). *A dancer takes flight: Psychological concerns in the development of the American male dancer.* Publisher etc.

Edwards, A. L. (1977). Comments on Shweder's "Illusory correlation and the MMPI controversy." *Journal of Consulting and Clinical Psychology*, 45, 925-929.

Einhorn, H. J., & Hogarth, R. M. (1978). Confidence in judgment: Persistence in the illusion of validity. *Psychological Review*, 85, 395-416.

Broad review that concludes that information other than positive hits is ignored and frequency rather than relative frequency often determines judgments "concerns the difficulty people have in making use of 'disconfirming information,' by which is meant the information that can be gained by the nonoccurrence of an action or prediction." Their model stresses the importance of "the combination of judgments, actions, and environments that produces outcomes." While this statement is in a different context, it refers nicely to the distinction between probability learning types of studies and those that call for assessments of beliefs, such as typical IC studies.

Einhorn, H. J., & Hogarth, R. M. (1986). Judging probable cause. *Psychological Bulletin*, 99, 3-19.

Ellemers, N., & van Knippenberg, A. (1997). Stereotyping in social context. In R. Spear, P. J. Oakes, N. Ellemers & S. A. Haslam (Es.) *The social psychology of stereotyping and group life.* Cambridge, MA: Blackwell.

The section "Passive observers versus active agents" on pp. 219-223 deal directly with IC. IC is influenced by whether the subject is a member of one of the groups under consideration. Detached observers make memory-based judgments but insiders make on-line judgments.

Englis, B. G. (Ed.). (1994). *Global and multinational advertising.* Publisher etc.

Erlick, D. E., & Mills, R. G. (1967). Perceptual quantification of conditional dependency. *Journal of Experimental Psychology*, 73, 9-14.

Feldman, J. M., Camburn, A., & Gatti, G. M. (1986). Shared distinctiveness as a source of illusory correlation in performance appraisal. *Organizational Behavior and Human Decision Processes*, 37, 34-59.

Four studies in an investigation of the possible role of IC in I-O psychology, using the Hamilton & Gifford (1976) paradigm.

Experiment 1

152 undergrads were exposed to 39 statements about 2 groups with a cell structure of 18:9:8:4 in a 2 X 3 X 2 factorial (affective value X target group type X delay) . The statements were either extremely good vs. average or average vs. extremely poor comments concerning job performance as a firefighter. The group types were arbitrary (Fire Co. A vs. Fire Co. B) ethnicity (Anglo-American vs. Latin American) and gender. The third variable was immediate responding vs. 24 hour delay. Stimulus presentation was via booklet. The dependent variables were evaluation, recognition and estimation of cell frequencies. There was no IC effect.

Experiment 2

This was a replication of exp 1 to test McArthur's "readiness" hypothesis. The Ss were 56 firemen, and only the Fire Co. target groups were used. The delay was 12 h rather than 24. There was no IC effect.

Experiment 3

87 undergraduates served in a replication of exp 2, in which much more extreme items, both positive and negative, were now contrasted with the average ones. Weak support for IC effects were found. Average f was .05.

Experiment 4

67 undergraduates were shown good vs. poor statements, as contrasted with the comparisons with average statements in the above experiments. This time the evaluation and estimation dependent variable were significant, but the mean f did not differ from 0.

Discussion

The authors concluded that "the results suggest that the creation of illusory correlation based only on shared distinctiveness requires a high degree of affective contrast to create the necessary distinctiveness." Further, they concluded that "the studies reported here have shown that one source of illusory correlation, though theoretically relevant, is likely to be irrelevant in practice."

Fiedler, K. (1991). The tricky nature of skewed frequency tables: An information loss account of distinctiveness-based illusory correlations. *Journal of Personality and Social Psychology*, 60, 24-36.

Fiedler deals with what has been called distinctiveness-based illusory correlations in the Hamilton & Gifford (1976) paradigm using differential frequencies as carriers of distinctiveness. He argues that regression effects constitute more loss of information with the smaller frequencies, thus accounting for the illusory correlation without the need for introducing the distinctiveness construct. He also questions whether rarity is a sufficient condition for distinctiveness. Fiedler does acknowledge the importance of distinctiveness, but argues that the research in the Hamilton & Gifford paradigm is accounted for by regression effects. In addition to regression (or differential reliability) effects, Bayesian and response

scale explanation also bear on the issue.

In addition to the theoretical contributions, Fiedler presents the results of four empirical studies in which distinctiveness explanations do not apply.

Exp 1

Cells with 0 frequencies were used. Zero frequencies cannot be said to be "distinctive," but regression effects can and did occur. The frequencies presented did not have $f = 0$.

Exp 2

Replication of Hamilton & Gifford with 18:8:9:4 and the reverse. The key finding was the interaction between majority/minority status and the actual distributions of positive vs. negative behaviors on the judged proportions of negative behaviors, supporting an explanation in terms of information loss. There was virtually no differential information retained about the minority groups.

Exp 3

Fiedler split one of three categories into two subcategories and derived a prediction from regression considerations that could not be derived from distinctiveness considerations. Exp 3, which was not an illusory correlation study, showed the predicted increase in judged frequency when categories were split.

Exp 4

This was also a category splitting study, but was an illusory correlation study, using 18:8:9:4 frequencies. The same behavioral statements were presented to subjects, but the frequency judgments for one group were split such that instead of estimating the proportions of negative and positive behaviors for groups A and B, the estimates were split such that the estimates were for two subgroups of positive behaviors. As predicted from regression effects, the bias in favor of the majority group did not occur in the split condition.

Fiedler, K. (1996). Explaining and simulating judgment biases in probabilistic, multiple-cue environments. *Psychological Review*, 103, 193-214.

Fiedler, K. Beware of samples! A cognitive-ecological sampling approach to judgment biases. (2000). *Psychological Review*, 107, 659-676.

Reinterprets many judgement biases in terms of ideas that judgments are always based on sample, samples are almost always biased, people's judgments based on the samples are "often remarkably accurate - reflecting precisely the information conveyed by the sample," but that people do not have the metacognitive devices necessary to understand sampling constraints. Fiedler defines 3 kinds of sampling, predictor, outcome and selective outcome. The Ss in our data search IC studies were apparently doing the latter.

His explanation of IC is relevant only to the paired distinctiveness IC, in that the different sample sizes provide differentially valid information in two related senses. One is a "density effect," $A+D > B+C$. The other is in terms of statistical significance; the group with the larger sample allows a more confident judgment. Again, note that none of this is relevant to the IC studies with $A=B=C=D$.

Fiedler, K., Hemmeter, U., & Hofman, C. (1984). On the origin of illusory correlations. *European*

Journal of Social Psychology, 14, 191-201.

Used both equal (9:9:9:9) and unequal (16:8:8:4) frequencies. Manipulated number of repetitions of lists as well as data structure, neither of which influenced IC, which was measured by asking Ss to recall the proportion of statement types in two cells and subtracting. Ratings were also on line. Concluded that "stereotypical influence which gives rise to an illusory correlation is effective at all stages of information processing where some uncertainty has to be reduced: When the stimulus series is perceived and encoded, when the information is reconstructed on the cued-recall test, when statistical properties of the series are estimated, and when the impressions of the target persons are expressed within an adjective space."

The group effect was attributed to extreme ICs in a fourth of the Ss.

Fiedler, K., Russer, S., & Gramm, K. (1993). Illusory correlations and memory performance. Journal of Experimental Social Psychology, 29, 111-136.

This paper reports a study of distinctiveness-based IC, and deals with an information loss account of such IC in contrast with the more widely accepted distinctiveness explanation. The introduction details the memory loss conception. 60 Ss served in 4 groups. Two between S factors were target reference (groups vs person) and encoding task (evaluation vs none). The data structure was 18:9:8:4. Frequency estimation, cued recall and impression judgments were the three DVs. The mean f coefficients were .12 and .10 in the frequency estimate and cued recall DVs, respectively, both statistically significant. Extensive secondary analyses were performed, including an unusual TSD analysis.

The experiment provides very strong evidence for an information loss account (with less information about the minority, memories are less reliable and more subject to regression effects). The investigators see the result as enhancing the importance of the IC effect as explicated by Hamilton & Gifford, but explain it in more generalizable terms.

Fiedler, K., Walther, E., & Nickel, S. (1999). The autoverification of social hypotheses: Stereotyping and the power of sample size. Journal of Personality and Social Psychology, 77, 5-18.**Freedman, E. G., & Smith, L. D. (XXXX). The role of data and theory in covariation assessment. Manuscript. Michigan Technical University, Houghton, MI.**

Presented Ss with 36 scatterplots (12 positive relation, 12 negative and 12 zero) of self ratings of personality traits, n of data points = 67. Ss rated covariation on a 201 point scale after having the concept of correlation explained. Theory and data both influenced the judged correlations. Theory based estimates were higher. No IC effect was found for the Ss who had $r = 0$.

Friedland, N, Keinan, G. & Tytiun, T. (1999). The effect of psychological stress and tolerance of ambiguity on stereotypic attributions. Anxiety, Stress & Coping: An International Journal, 12, 397-410.**Furlotti, L. (1993). Gli studi sulla correlazione illusoria e le implicazioni per gli stereopi sociali. Giornale Italiano di Psicologia, 20, 367-394.****Garcia-Marques, L., & Hamilton, D. L. (1996). Resolving the apparent discrepancy between the incongruency effect and expectancy-based illusory correlation: The TRAP model. The Journal of Personality and Social Psychology. 71, 845-860.**

The incongruency effect is that when subjects are given an impression formation set, then a set of descriptors, then a set of behaviors, the proportion of incongruent behaviors recalled is higher than the proportion of congruent behaviors which is in turn higher than the proportion of neutral behaviors.

Exp 1

Ss were 160 undergraduate students. Stimulus materials were statements about the characteristics of two contrasting occupational groups in a 2X3 design, 6 statements per cell, with the statements being either congruent, incongruent or neutral with respect to the occupational group. Hence $r = 0$. Both impression formation instructions and memory instructions were used, for both individual and group targets. The predicted IC effect, as measured by superior group identifications of congruent items as compared with incongruent and neutral items. was found for both group and individual targets and for both impression formation and memory instructions. They concluded that "the generality of the illusory correlation effect has been greatly enhanced." They also concluded that the results showed dissociation of the effect of expectancies on free recall and frequency estimates.

Exp 2

Essentially replicated key conditions of exp 1 with instructions to rule out biased encoding and reinterpretation explanations of the results of exp 1. The IC effect was replicated, again with orthogonal stimulus materials.

Exp 3

Another replication with instructions to rule out the possibility that the results are due solely to the preexisting stereotype or impressions formed during the task which obviated the search processes implicated in the TRAP model. Exp 3 compared equal set size stimulus materials with the unequal set sizes (6:6:6:6 VS. 9:3:9:3). IC was obtained in both conditions, but the IC was higher in the \neq set than the $=$ set.

Garcia-Marques, L., Sherman, S. J., & Palma-Oliveira, J. M. (2001). Hypothesis testing and the perception of diagnosticity. *Journal of Experimental Social Psychology*, 37, 183-200.

Not an IC study but a careful analysis of the relation between research on the assessment of covariation and hypothesis testing, and a call for closer integration of the two. One conclusion is that under some conditions, very simple strategies (a-b) are used.

Garland, H., Hardy, A., & Stephenson, L. (1975). Information search as affected by attribution type and response category. *Personality and Social Psychology Bulletin*, 1, 612-615.

Gnys, J. A., Willis, G. W., & Faust, D. (1995). School psychologists' diagnoses of learning disabilities: A study of illusory correlation, *Journal of school psychology*, 33, 59-73.

Not an IC study at all. Gnys et al. sent out one profile, a hypothetical WISC profile, per S and concluded that the judgments based on data that they asserted had no validity were therefore based on illusory correlation.

Goddard, M., & Allan, L. G. (1988). A critique of Alloy & Tabachnik's theoretical framework of understanding covariation assessment. *Psychological Review*, 95, 296-298.

This is a critique of some details of Alloy & Tabachnik's (1984) model presented in Psych Review. Goddard and Allan claim that the model misrepresents aspects of the covariation literature and is not consistent with experimental data. (See Alloy, 1988).

Golding, S. L. (1971). "Illusory" correlation in the learning of clinical judgment. *Dissertation Abstracts International Vol 31(10-B) 6256-6257.*

Golding & Rorer (1972) was based on this dissertation.

Golding, S. L., & Rorer, L. G. (1972). Illusory correlation and subjective judgment. *Journal of Abnormal Psychology*, 80, 249-260.

According to the authors, they are only the third investigators into the IC phenomenon (after the Chapmans and Starr & Katkin). Ss were 120 male students. The materials were Rorschach cards with 4 classes of cues (C) and 4 classes symptoms (S). The response measures were verbal descriptions, P(C|S) and P(S|C). The factors manipulated were learning, feedback, cue-symptom contingency, and symptom base rate. Generalization to new stimuli was assessed. Two symptoms were associated with each cue. The authors concluded that "The results of this investigation indicate that illusory correlation is an extremely strong phenomenon which is resistant to change even under intensive training conditions." The major relation was found between anality in the cues and homosexuality as a symptom." There were a variety of base rate and contingency conditions, but in several, the contingency between anality and homosexuality was .50. In these conditions, Ss nevertheless reported a high level of association.

Gordon, R. A., (1997). The moderation of distinctiveness-based illusory correlation: The impact of circadian variations and personal need for structure. *The Journal of Social Psychology*, 137, 514-526.

Standard paired-distinctiveness paradigm with 18:8:9:4. Both circadian rhythm and need for structure were related to IC. People with a mismatch between optimal functioning time and when the IC task was done and people with high need for structure showed IC, in contrast with the other groups.

Gresham, F. M. (1993). "What's wrong with this picture?": Response to Motta et al.'s review of human figure drawings. *School Psychology Quarterly*, 8, 182-186.

Hamilton, D. L. (1976). Cognitive biases in the perception of social groups. In J.S. Carroll & J. Payne (Eds.) *Cognition and social behavior*. Hillsdale, N.J.: Erlbaum.

Hamilton, D. L. (1979). A cognitive-attributinal analysis of stereotyping. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology*, vol 12. New York: Academic Press.

Hamilton, D. L. (1981a). Illusory correlation as a basis for stereotyping. In D. L. Hamilton (Ed.), *Cognitive processes in stereotyping and intergroup behavior*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Reviews the literature up to 1980. Presents steps similar to Crocker's (encoding, retention, retrieval, integration). Says that IC is a factor in stereotyping, but that "any actual stereotype about a social group is multiply determined." Explores IC as having a role in both the development and the maintenance of stereotypes. Explores explanations of IC in terms of availability and schema driven processes, accepts that IC may be due to paired distinctiveness and to expectancies.

Hamilton, D. L. (Ed.). (1981b). *Cognitive processes in stereotyping and intergroup behavior*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Hamilton, D. L., Dugan, P. M., & Trolie, T. K. (1985). The formation of stereotypic beliefs: Further evidence for distinctiveness-based illusory correlation. *Journal of Personality and Social Psychology*, 48, 4-17.

Two studies dealing with the paired distinctiveness hypothesis. Study 1 had cell frequencies were 18:8:9:4, and presented information in three ways, serial only, table only, serial then table. Groups with serial presentation formed IC, tabular did not, which was interpreted as supporting encoding but not integration explanations. They also presented a new sample of Ss with summary tables only, varying in cell frequencies such that each S saw tables with positive, negative and zero f values. Ss were significantly and appropriately influenced by the f values.

Study 2 tested the hypothesis that it was the majority group's data that was salient rather than the minority groups, using a recall task. Study 1 had cell frequencies were 18:8:9:4, and presented information serially. The IC effect of study 1 was replicated, and recall was highest for cell D sentences, supporting the original paired distinctiveness hypothesis.

Hamilton, D. L., & Gifford, R. K. (1976). Illusory correlation in interpersonal perception: A cognitive basis of stereotypic judgments. *Journal of Experimental Social Psychology*, 12, 392-407.

This was the first study linking IC to social stereotyping. This claim was predicated upon the proposition that IC is distinctiveness based, i.e., is induced by the co-occurrence of statistically infrequent events. In Experiment 1, they had 39 statements (A=18, B=9, C=8, D=4) and used 3 dependent variables. They found IC with a bias against the minority group. In Experiment 2, the Es reversed the cell frequencies, and found bias in favor of the minority group.

Hamilton, D. L., & Rose, T. L. (1980). Illusory correlation and the maintenance of stereotypic beliefs. *Journal of Personality and Social Psychology*, 39, 832-845.

Exp1:

Purpose: to see if IC is implicated in the processing of new info about stereotyped groups. 20 Ss read 24 cards w occupational titles and trait adjectives differentially stereotypic of the occupations, but with no statistical association between the traits and occupations. Each of three occupations was paired by each of 8 traits twice, yielding $r = 0$. Dependent variable: did Ss report higher frequencies of stereotype-consistent traits w the associated occupations

Exp 2

Purpose was see if IC is implicated in the processing of new info about stereotyped groups even in the presence of true correlations between occupations and traits. 56 high school and college students read 24 cards w occupational titles and trait adjectives differentially stereotypic of the occupations, but with high or moderate statistical associations between the traits and occupations

Dependent variable: Ss were given the adjectives and report frequencies of times each of the occupations appeared with that trait. The source of IC is association of trait and occupation. Ss report even stronger associations than actually exist. Measure of IC was ANOVA of means

Exp 3:

Purpose of experiment 3 was to see if IC is implicated in the processing of new info about stereotyped groups even in the presence of true negative correlations between occupations and traits. 52 college students read 24 cards w occupational titles and trait adjectives differentially stereotypic of the occupations, but with negative statistical associations between the traits and occupations. The Ss were given the adjectives and report frequencies of times each of the occupations appeared with that trait. Source of IC is association of trait and occupation. Ss report significantly lower frequencies for incongruent trait-occupation pairs.

Hamilton, D. L., & Sherman, S. J. (1989). Illusory correlations: Implications for stereotype theory and research. In D. Bar-Tal, C. F. Graumann, A. W. Kruglanski, W. Stroebe (Eds.), *Stereotyping and prejudices: Changing conceptions*. New York: Springer-Verlag.

Focuses on distinctiveness-based IC, acknowledges a second literature on the effect of preexisting

beliefs. Notes that history of IC began with Chapmans and that the tie to stereotyping was made by Hamilton & Gifford (1976). They conclude that IC is a highly reliable phenomenon, and adduce much evidence supporting the propositions that IC is based on the co-occurrence of distinctive stimuli. They discuss limits, and note that IC may be implicated in the original development of stereotypes. specify some of the influences on IC:

1. way we process information
2. group size
3. retrieval vs. encoding, which implicates instructions and mode of data presentation
4. Is it overestimation of majority group or devaluation of minority - they conclude the latter, which implicates overestimation of Cell D
5. distinctiveness, which can be manipulated in ways other than relative frequencies
6. self and group interest. If the target is the self, the direction of IC can be reversed
7. motivational factors

Hamilton, D. L., & Sherman, S. J. (1996). Perceiving Persons and Groups. Psychological Review, 103, 336-355.

A nonempirical study emphasizing the expectancies concerning the roles of unity and coherence in individual and group targets. The central point is that the perceived degree of entitativity influences impression formation.

Fundamental postulate: The perceiver assumes unity in the personalities of others, and persons are seen as coherent entities: therefore, one's impression of another person should reflect that unity and coherence.

principles following from this

1. perceiver seeks to draw inferences about dispositional properties constituting the core of personality.
2. perceiver expects consistency
3. perceiver seeks to develop an organized impression
4. perceiver strives to resolve inconsistencies in the information acquired about the target person

Groups are typically perceived as less entitative than individuals, hence judgments about individuals more likely to be on line rather than memory based. Groups more likely to have ICs formed about them.

The authors review the IC lit to support this last claim.

They also review the role of primacy effects.

The fundamental postulate of entitativity and the principles drawn from the postulate may be useful in structuring a review. The ideas are that the targets about whom or which we are forming impressions

that we strive to be as organized as possible are perceived as entities, which should be consistent and coherent if they are to be organized.

Hamilton, D. L., Stroessner, S. J., & Mackie, D. M. (1993). The influence of affect on stereotyping: The case of illusory correlations. In D. M. Mackie & D. L. Hamilton, (Eds.), *Affect, cognition, and stereotyping: Interactive processes in group perception*. New York: Academic Press, pp. 39-61.

Primarily a chapter reporting results of studies of mood states rather than IC. "... our strategy entails investigating the effects of mood states on a well-defined cognitively based phenomenon that (1) has been well-researched in the last decade and (2) influences group perceptions. Specifically we investigated the influence of mood on illusory correlation..." (p. 40). They distinguish between two bases from which IC may derive, distinctiveness-based (which relates to the initial formation of stereotypes) and expectancy-based (by which stereotypes become self-perpetuating. Had positive, negative and neutral mood inductions. Neutral Ss formed ICs as expected; those with mood inductions did not. Es concluded from memory data that mood interfered with information processing. A second study found that only the neutral Ss differentially processed distinctive information. Used processing time as a direct measure of information processing to assess idea that mood affected processing affected IC.

Hamilton, D. L., & Zanna, M. P. (1972). Differential weighting of favorable and unfavorable attributes in impressions of personality. *Journal of Experimental Research in Personality*, 6, 204-212.

Haslam, S. A., McGarty, C. (1994). Some problems with the measurement of illusory correlation. *European Journal of Social Psychology*, 24, 611-621 1994.

The distinctiveness-based IC paradigm has 3 measurement problems; 1. exclusion of Ss who attribute more behaviors to the minority group, 2. regression to the mean (Fiedler's point) leading to loss of more behaviors associated with the majority, and 3. the Z transform may be especially inappropriate when both + and - correlations are present, as this will lead to bimodality. They ran a large IC study, and found support for all three issues (though the obtained Zs were more leptokurtic rather than bimodal). The authors obtained illusory correlations of the order of .25, then after correcting for the problems of about .20 by the 3 measures of IC.

Haslam, S. A., McGarty, C., & Brown, P. M. (1996). The search for differentiated meaning is a precursor to illusory correlation. *Personality & Social Psychology Bulletin*, 22, 611-619.

This study was designed as a replication "identical in every respect to that of Hamilton & Gifford's (1976, Experiment 1) except that subjects would have less ground for believing that it was meaningful to differentiate between the groups in terms of the underlying evaluative dimension." 60 first year Intro psych students served as Ss. The data structure was 18:9:8:4. The dependent variables included the usual three; cued recall, trait ratings and frequency estimates. A questionnaire concerning the subjects' beliefs about whether they were trying to meaningfully differentiate between groups and to assess several explanations of IC. The control Ss were given the Hamilton & Gifford instructions. The experimental Ss had these instructions modified so that the two groups were a sample of right-handed people and a sample of left-handed people. Control Ss showed significant f coefficients on cued recall and frequency estimation (.11 and .18), but the experimental Ss did not (.06 and .02). The results for trait ratings were similar. The authors concluded that "subjects' responses in the standard illusory correlation paradigm can be understood not as outcomes of information-processing error but as manifestations of the quest for, and the discovery of, subjectively relevant social meaning."

Haslam, S. A., McGarty, C., Oakes, P. J., & Turner, J. C. (1993). Social comparative context and illusory correlation: Testing between ingroup bias and social identity models of stereotype

formation. *Australian Journal of Psychology*, 45, 97-101.

Harris, S.L. (1990). The illusory correlation and perceptions of male and female managers. *Dissertation Abstracts International Vol 51(4-B) 2097-2098*.

Hartsough, W. Ross (1975). Illusory correlation and mediated association: A finding. *Canadian Journal of Behavioural Science*, 7, 151-154.

Hipp, K. M. (2000). Information selection and the assessment of covariation in familiar and novel domains. Unpublished doctoral dissertation, Bowling Green State University.

Ilgen, D. R., & Feldman, J. M. (1983). Performance appraisal: A process focus. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behaviors*, Vol. 5. Greenwich, CT: JAI Press.

Inhelder, B., & Piaget, J. (1958). *The growth of logical thinking from childhood to adolescence*. New York: Basic Books.

Jackson, J. W. (2000). Demonstrating the concept of illusory correlation. *Teaching of Psychology*, 27, 273-276.

Classroom demonstration, using the Hamilton & Gifford paradigm.

Jenkins, H. M., & Ward, W. C. (1965). Judgment of contingency between responses and outcomes. *Psychological Monographs*, 79, (1., Whole No. 594).

Jennings, D. L., Amabile, T. M., & Ross, L. (1982). Informal covariation assessment: Data-based versus theory-based judgments. In D. Kahneman, P. Slovic, & A. Tversky (Eds.). *Judgment under uncertainty: Heuristics and biases* (pp. 211-230). New York: Cambridge University Press.

Johnson, C. A. (1994). The affective and cognitive components of distinctiveness-based illusory correlations. *Dissertation Abstracts International: Section B: The Sciences & Engineering Vol 54 (8-B) 4444*.

Johnson, C., & Mullen, B. (1993). The determinants of differential group evaluations in distinctiveness-based illusory correlations in stereotyping. *British Journal of Social Psychology*, 32, 253-263.

Meta-analysis of 12 comparisons across seven published papers. Evaluation DVs much more strongly linked to estimation ICs than to assignment ICs; estimation is more sensitive to the affective component of the stimulus material than is assignment. The meta-analysis showed highly consistent ICs across studies, with a magnitude of the IC being in the moderate range. All effects were in the direction expected according to which was the minority group.

Johnson, C., & Mullen, B. (1994). Evidence for the accessibility of paired distinctiveness in distinctiveness-based illusory correlation in stereotyping. *Personality and Social Psychology Bulletin*, 20, 65-70.

Used 36 sentences with $f = 0, 4$ different stimulus arrangements. Measured IC by having Ss assign sentences from memory to groups A and B. Unique contribution was to measure response latencies, which correlated with subjective f . Ss were especially sensitive to the B- cell, the frequency of which they overestimated, and to which they responded more quickly. as the title suggests, the authors interpreted these results as support for the proposition that paired distinctiveness was the fundamental cause of IC. They took their results as largely ruling out exemplar based and regression explanations.

Johnson, C., Schaller, M. & Mullen, B. (2000). Social categorizing and stereotyping: 'You mean I'm one of "them"'? *British Journal of Social Psychology*, 39, 1-25.

Two experiments using distinctiveness-based IC were run, leading Ss into stereotypes of a minority group.

Experiment 1

The Es varied the temporal sequence concerning when Ss (intro psych students) learned they were part of the target (minority) group. There were 3 conditions, Before, After and Control. The data structure was 16:8:8:4. Ss were assigned to Before and After conditions based on when they made preference judgments about abstract patterns. They were told they were Augmenters or Levelers depending on their choice, but all Ss were in the minority group. There were 3 DVs. One was how many of the 24 statements about each group A were negative. A second involved assigning each statement to the appropriate group, and the third was a likability rating. Weak but significant IC effects were found for estimation for the Control and After groups, but not for the Before group. "When membership in the distinctive group was unable to affect on-line processing (the After condition), the IC was both significant and statistically equivalent to that in the Control condition.

Experiment 2

Exp 2 was a replication of exp 1 again with intro psych students, but two additional groups were run. These were Ss assigned to the majority group either Before or After exposure to the stimuli. Significant IC effects were found in all conditions. Categorization into the small group before learning of one's membership in that group prevented IC from forming; precategorization into the large group did not.

Johnston, K. E. (2000). Illusory correlation in children: Cognitive and motivational biases in children's group impression formation. *Dissertation Abstracts International: Section B: The Sciences & Engineering Vol 61(4-B) 2244 Univ Microfilms International, US.*

Johnson, C., Mullen, B., Carlson, D., & Southwick, S. (2001). The affective and memorial components of distinctiveness-based illusory correlations. *British Journal of Social Psychology*, 40, 337-358.

Used 36 sentences with $f = 0$ in two experiments plus a briefly described followup. Proposed a model whereby two separate components influenced IC, memory and affect, and did so separately depending on the dependent variable. Mean ICs were consistent with predictions. The authors concluded that the results supported the distinctiveness-based explanation of IC, but were inconsistent with Fiedler regression explanation and Smith's explanation, which hinged on differential frequencies, and not consistent with McGarty's motivated categorization conception. In this study, there were differential frequencies, but they were invariant over conditions and IC was not. Useful discussion of other approaches.

Jones, R. A. (1982). Perceiving other people: Stereotyping as a process of social cognition. In A. G. Miller (Ed.), *In the Eye of the Beholder: Contemporary Issues in Stereotyping* (pp. 41-91). New York: Praeger.

Does not refer to IC at all.

Juslin, P., & Olsson, H. (2003). Capacity limitations and the detection of correlations: Comment on Kareev (2000). Unpublished manuscript, Umea University.

Criticism of Kareev's analysis in that Kareev used hit rate rather than $P(H|S)$ and that Kareev considered only signal trials. Juslin & Olsson criticize the small window claim on logical grounds, and go on to replicate and extend Kareev's simulation, this time employing a TSD methodology. Juslin & Olsson

departed from Kareev in including what they referred to as a noise (N) distribution in addition to a signal (SN) distribution, in contrast to Kareev's exclusive reliance on a signal distribution. Juslin & Olsson's N distribution differs from the traditional TSD distribution in that instead of it being a random sample from a population with $r = 0$, it was a sample from a distribution with $r < 0$ a randomly sample value of c , a criterion for what they called (after Kareev), a useful f correlation. "For all distributions and ranges of criteria, the ability to distinguish useful from less useful correlations is a monotonically increasing function of sample size." Another issue raised by Juslin and Olsson is the number of undefined correlations when n is small and the marginals are unequal.

Kahneman, D., Slovic, P., & Tversky, A. (Eds.). (1982). Judgment under uncertainty: Heuristics and biases. New York: Cambridge University Press.

Kammann, R., & Campbell, K. (1982). Illusory correlation in popular beliefs about the causes of happiness. New Zealand Psychologist, 11, 52-63.

Kao, S.-F., & Wasserman, E. A. (1993). Assessment of an information integration account of contingency judgment with examination of subjective cell importance and method of information presentation. Journal of Experimental Psychology: Learning, Memory, and Cognition, 19, 1363-1386.

Kareev, Y. (1995a). Positive bias in the perception of covariation. Psychological Review, 102, 490-502.

Analyzes the statistical features of sequential ecologies and concludes that two sorts of series of binary values which he called typical and atypical, are possible. Typical series are those in which the probabilities of each event corresponds to its probability in the population as a whole. Alternation rates are more frequent in typical than in atypical series, hence atypical series tend to show positive dependencies. A conjecture that is crucial to Kareev's analysis and predictions is that "people judging a series perceive its overall composition, i.e., the relative frequency of each event or value) before they detect the degree of relationship between successive events or co-occurring values."

Experiment 1 involved predictions in a series of binary events. Experiment 2 was an assessment of covariation study. There were 7 levels of actual f , -0.6 through $+0.6$ in steps of $.02$, with all conditions employing unequal marginals. Stimulus materials were 128 envelopes marked red or green, each with a coin marked X or O. Subjective f coefficients were inferred from the predictions, and they exceeded objective f . Kareev provided a formal argument that positive correlations, as he defined them for 2×2 contingency tables, are more useful than negative correlations.

Kareev, Y. (1995b). Through a narrow window: Working memory capacity and the detection of covariation. Cognition, 56, 263-269.

Not an empirical paper. Kareev argues that the limited working capacity of human memory coupled with the bias in the sampling distribution of r with small samples contributes to the detection of correlation in the world. He asserts that "limited capacity may also lead to unwarranted hypotheses and even (though infrequently) to incorrect hypotheses, but such hypotheses will soon be refuted by incoming data."

Kareev, Y. (2000). Seven (indeed, plus or minus two) and the detection of correlations. Psychological Review, 107, 397-402.

Not an empirical paper. Kareev shows that samples with $N = 7 \pm 2$ taken from a population with $f > .50$ are more likely to produce a sample correlation $>$ the population v . Furthermore, Kareev found that the correlation at which the proportion of times the correlation was useful (did better than the base rate) first exceeded 50% was $.53$. Hence he was arguing for the adaptability of the organism. Note that his usefulness argument hinges on having unequal marginal frequencies.

Note: I keep wondering what criterion real Ss would use for detecting a correlation, and whether that would lead to many illusory correlations in light of the broad sampling distributions of f when N is very small.

Kareev, Y., Lieberman, I., & Lev, M. (1997). Through a narrow window: Sample size and the perception of correlation. *Journal of Experimental Psychology: General*, 126, 278-287.

Experiment 1

Measured the span of STM. Gave Ss prediction task and inferred f from their prediction matrices. Ss with lower digit spans were more likely to detect correlation when it existed. Kareev had a $f = 0$ condition in which Ss' mean f was ns. Objective f ranged from $-.6$ to $+.6$. The authors inferred subjective f from 128 trials of an SCPL experiment. Kareev argued that inferring f from predictions "uses natural behavior rather than having the participant consciously assess the degree of covariation in the data, which is a task that many find unnatural." (I think that Kareev missed the point that talking in terms of relationships may also be natural, just different, and that there may be an important disconnect between prediction and beliefs.)

Experiment 2.

Measured digit span. Used 3 X 2 design. Had three groups with number of trials with N either -2 , 0 or $+2$ larger than digit span. Ss observed N trials sampled from a population of 100 cases with $r = .70$. For half the Ss the data were all present at the time of prediction, for half the data were out of sight. Measure of perceived correlation was based on a single prediction. "When the sample was out of view at the time of prediction, the smaller the sample, the greater the correspondence between the standard scores of the predictor and criterion; but when the complete sample remained in full view, the larger the sample, the greater the correspondence."

There are some anomalies in the data, such 50% of the predictions were in the wrong direction for the -2 absent Ss. The significant interactions are due in large part to chance behavior or worse.

Kelley, H. (1967). Attribution theory in social psychology. In D. Levine (Ed.), Nebraska symposium on motivation (Vol. 15). Lincoln: University of Nebraska Press.

Kennedy, S. J., Rapee, R. M., & Mazurski, E. J. (1997). Covariation bias for phylogenetic versus ontogenetic fear-relevant stimuli. *Behaviour Research & Therapy*, 35, 415-422.

Kim, H., & Baron, R. S. (1988). Exercise and the illusory correlation: Does arousal heighten stereotypic processing? *Journal of Experimental Social Psychology*, 24, 366-380.

The hypothesis underlying this study was that "simplifying seem particularly likely to be employed when the processing of the presented material becomes difficult, effortful, or when people are overloaded." Ss were 42 male undergraduates, who read 24 sentences pairing traits with 3 occupations twice, as they exercised at one of two levels. Trait adjectives were either consistent or inconsistent with the occupation, as assessed by prior ratings. The relevant dependent variable was estimations of the frequency with which each adjective was paired with each occupation. Impression formation instructions were used. The dependent variable rating form had the original 8 adjectives and 6 new items. Overestimation of co-occurrence was greater when the adjectives were consistent with the occupational stereotype, and greater with high arousal than low.

King, R. N. & Koehler, D. J. (2000). Illusory correlations in graphological inference. *Journal of*

Experimental Psychology: Applied, 6, 336-348.

Investigates whether IC may contribute to the maintenance of beliefs in graphology.

Exp 1

A variant of an IC study with random pairings of 40 hypothetical personality profiles with 40 handwriting samples. Each handwriting sample was coded on 6 characteristics, and there were 7 personality dimensions. Personality dimensions that were intuitively correlated were correlated moderately in the profiles. The mean r between personality traits and handwriting features was 0, with $s = 15.78$ intro students were Ss. The DV was a set of ratings of the degree to which people with given traits would have certain attributes, made on a bipolar scale. The semantic association between trait names and descriptors of the handwriting characteristics accounted for significant rating variance; the statistical association in the data did not. The authors concluded that "This perception of uncorrelated variables as empirically related constitutes what Chapman and Chapman (1967) referred to as illusory correlation."

Exp 2

Not a typical IC study, in that for 4 of 6 pairs of personality traits and handwriting samples, the correlations were near unity. Two of the 4 were congruent with graphological lore, the other 2 were incongruent. Statistical association, as expected, now did account for variance, but so did semantic association. Incongruence strongly attenuated the effect of statistical association.

Klauer, K. C. & Meister, T. (2000). A source-monitoring analysis of illusory correlations. *Personality and Social Psychology Bulletin*, 26, 1074-1093.

Klayman, J. & Ha, Y.-W. (1987). Confirmation, disconfirmation, and information in hypothesis testing. *Psychological Review*, 94, 211-228.

Kleiter, G. D., Krebs, M., Doherty, M. E., Garavan, H., Chadwick, R., & Brake, G. (1997). Do subjects understand base rates? *Organizational Behavior and Human Decision Processes*, 72, 25-61.

Not an IC study. This was part of a 6 experiment paper investigating Ss' sensitivity to the importance of base rates for valid inference. Experiment 5 had 117 Ss from the University of Salzburg indicate which cells of a matrix were important to whether there was a correlation. Only 4% of the Ss selected data optimally. The cell selections in what was referred to as the core (i.e., the 2X2) and the relevance ratings followed the typical pattern reasonably closely, $A > B > C_D$.

Kubota, K. (1997). Intergroup discrimination and illusory correlation induced by social category: Minority, majority, and outsider. *Japanese Journal of Psychology*, 68, 120-128. (abstract in English).

"Two experiments were conducted to examine intergroup discrimination and illusory correlation in majority members and minority members and outsiders of a group. In Experiment 1, allegedly based on social attitudes, 64 participants were divided into three groups, and then completed a point distribution task in a minimal group paradigm. It was found that although both minority and majority members showed ingroup favoritism, outsiders favored neither majority nor minority. In Experiment 2, a continuation of Experiment 1, 45 statements were shown that described majority members and minority members in favorable and unfavorable terms. The majority members perceive illusory correlations between the minority group and infrequent, unfavorable characteristics, whereas the minority members did not. The results suggest that for the majority, both distinctiveness-based cognitive bias and ingroup bias had the same effects on perception of illusory correlation, whereas for the minority, the two had

opposite effects. The outsiders did not perceive any illusory correlation."

Kurtz, R. M., & Garfield, S. L. (1978). Illusory correlation: A further exploration of Chapman's paradigm. *Journal of Consulting & Clinical Psychology*, 46, 1009-1015.

This is a replication and extension of part of Chapman and Chapman (1969), designed to see whether explicit training (actually, instructions) would affect IC. Ss were from undergraduate abnormal psychology classes. There were 4 groups: group 1. 50% presentation of all valid and invalid signs, group 2. valid signs resented 100% of the time with homosexuality and invalid signs 50% of the time, group 3. same as group 1 but with debiasing instructions, group 4. same as group 2 but with debiasing instructions. The materials were Rorschach cards, as in Chapman and Chapman (1969), with one sign and two symptoms per card. The instructions had no effect. The Ss produced the usual IC for anality/homosexuality, and also an unexpected one for things that look small/inferiority. The authors concluded that "it does appear that there is a strong tendency among subjects to find meaning in clinical material even if such meaning does not exist."

Lamiell, J. T. (1980). On the relationship between conceptual schemes and behavior reports: A closer look." *Journal of Personality*, 48, 54-73.

Not relevant to IC. It prompted a reply by Shweder who referred to his "systematic distortion" hypothesis as akin to IC as defined by the Chapmans. If I understand this exchange correctly, IC in Shweder's and Lamiell's terms refers simply to strengths of beliefs about correspondence between personality traits that are not warranted by data.

Lamiell, J. T. (1980). On the utility of looking in the "wrong direction." *Journal of Personality*, 48, 82-88.

See above.

Lane, D. M., Anderson, C. A., & Kellam, K. L. (1985). Judging the relatedness of variables: The psychophysics of covariation detection. *Journal of Experimental Psychology: Human Perception and Performance*, 11, 640-649.

This paper reports experiments on the inference of relatedness from scatterplots and tables, but no zero correlation arrays were presented.

Lang, R. S. Raulin, M. L., & Chapman, L. J. (1978). Illusory correlation and associative strength of words. *Canadian Journal of Behavioural Science*, 10, 264-266 1978.

A replication of a study by Hartsough (1975), who these investigators say had found a reverse relationship between strength of association and IC. Lang et al. presented 8 words in each of 5 colors, four with high color association, four non-associates. Hence the data structure is a 5X8 array with 1 observation per array, reducible to a 5X2 array, with 4 observations per array. Ss were asked to write the color, if any, in which the word had appeared most often. The results showed ICs for both color associates and non associates. Unlike Hartsough's results, the IC was not greater for the non-associates, but nonsignificantly in the opposite direction.

Lauer, T. W., & Post, G. V. (1989). Density in scatterplots and the estimation of correlation. *Behaviour and Information Technology*, 8, 135-244.

Levin, I. P., Wasserman, E. A., & Kao, S-F. Multiple methods for examining biased information use in contingent judgments. *Organizational Behavior and Human Decision Processes*, 55, 228-280.

Not an IC paper as such but an exploration of methodological, issues involved in inferring what people's models are. The authors used 3 methods of data analysis, pairwise comparisons using matrices constructed to yield cell use information, ANOVA and regression, in addition to self report. They

concluded that the order of cell usage was, in general, A>B>C>D, but they also provided cell usage data for individuals. They also concluded that "there was little correspondence between strategies reported by the majority of subjects and patterns revealed by the ANOVA tests.

A second experiment found an effect for prior expectancies.

A remarkable feature of the results was that the mean contingency judgment correlated .94 with delta p, and the median r for individuals was .81. However, the data structures were presented to Ss in matrix form, and in a within S design. [Between S, serial presentation of elements would almost certainly reveal a very different pattern of results.]

Lieberman, J. D. (1999). Terror management, illusory correlation, and perceptions of minority groups. *Basic and Applied Social Psychology*, 21, 13-23.

Not so much a study of IC as a use of IC to study another question. Found IC in experimental group (reminded of death) but not in control group in either of two studies. Multiple DV. Attempted to get IC by using different frequencies but same proportions of undesirable statements in two groups (A & B).

Lilli, W., & Rehm, J. (1983). Theoretische und empirische Untersuchungen zum Phaenomen der "illusorischen Korrelation" (illusory correlation). I. Ableitung von Randbedingungen fuer das Auftreten von Effekten der illusorischen Korrelation aus dem Konzept der Verfuegbarkeits- (availability-) Heuristik. *Zeitschrift fuer Sozialpsychologie*, 14, 251-261.

Lilli, W., & Rehm, J. (1984). Theoretische und empirische Untersuchungen zum Phaenomen der Zusammenhangstaeuschung: II. Entwicklung eines Modells zum quantitativen Urteil und Diskussion seiner Implikationen fuer die soziale Urteilsbildung. *Zeitschrift fuer Sozialpsychologie*, 15, 60-72.

Lipe, M. C. (1990). A lens model analysis of covariation research. *Journal of Behavioral Decision Making*, 3, 47-59.

This is a variation of a meta-analysis of assessment of covariation studies, in which Lipe entered the cell values from a number of studies as predictors of the objective and subjective values of f. Only 9 of 34 cases represented zero f. She concluded that subjects use all 4 cells of the table in making covariation estimates. She notes that "It is extremely difficult to set up experiments that will show which cells subjects are using, how the cells are being combined and how such usage varies or does not vary over the whole range of correlation (-1 to 1). (p. 49).

Loewy, M. I. (1995). Size bias by mental health professionals: Use of the illusory correlation paradigm. *Dissertation Abstracts International: Section B: The Sciences & Engineering Vol 56(3-B) 1704.*

Lord, R. G., & Maher, K. J. (1989). Cognitive processes in industrial and organizational psychology. 49-91 In *International review of industrial and organizational psychology*.

Lueger, R. J., & Petzel, T. P. (1979). Illusory correlation in clinical judgment: Effects of amount of information to be processed. *Journal of Consulting & Clinical Psychology*, 47, 1120-1121.

DAP stimuli, with 4 groups of Intro students, varying in the n of DAP cards, n = 3, 18, 45, 65. AS n increased IC increased. No information is given about the cell frequencies in the DAP stimuli.

MacDonald, M. G. (2000). Illusory correlation: A function of availability or representativeness heuristics? *Perceptual & Motor Skills*, 91, 343-350.

Mackie, D. M., Hamilton, D. L., Schroth, H. A., Carlisle, C. J., Gersho, B. F., Meneses, L. M., Nedler, B. F., & Reichel, L. D. (1989). The effects of induced mood on expectancy-based illusory correlations. *Journal of Experimental Social Psychology*, 25, 524-544.

Experiment 1

71 undergraduate students served as Ss in a 3 X 2 between design, with 3 levels of mood (positive, neutral, and negative) and 2 types of information (positive and negative adjectives) about 32 hypothetical people in different occupations. The stimulus structure was 8:8:8:8. The dependent variable was an estimate of the number of times the S saw each trait paired with each occupation. An IC effect was shown in the higher mean estimates of the frequency of stereotypic traits that warranted, and the IC effect was strongest when the valence of the induced mood and the stimulus attributes was incongruent. Subjective *f* indices were not provided.

Experiment 2

93 undergraduate students served as Ss in a literal replication of exp 1, except that in exp 2 the Ss' reading times for the sentences on the terminal were recorded. The IC results mirrored those of exp 1, and processing times for unrelated compared to stereotypic sentences were greater when mood and attribute valence were incongruent.

Madey, S. F., & Ondrus, S.A. (1999). Illusory correlations in perceptions of obese and hypertensive patients' noncooperative behaviors. *Journal of Applied Social Psychology*, 29, 1200-1217.

Makosky, V. P., Sileo, C. C., Whittemore, L. G., Landry, C.P., Skutley, M. L., (Eds). 1990 *Activities handbook for the teaching of psychology, Vol 3. ????*

Marcus-Newhall, A., Thompson, S., & Thomas, C. (2001). Examining a gender stereotype: Menopausal women. *Journal of Applied Social Psychology*, 31, 698-719.

Exp 1

This was not an IC study. Subjects were 90 people waiting in an airport departure lounge. They generated and listed items on several dimensions and then rate them for positivity/negativity. The items applied to men, 45 - 55, women, 45 - 55 and menopausal women. Menopausal women were viewed more negatively than women not so labeled.

Exp 2

Ss were 72 undergraduates. They were presented 96 statements that paired a category (midlife women, menopausal women, midlife men, someone with a disease) with each of 8 mood descriptors. The dependent variable was a questionnaire asking subjects to estimate the number of times each state had been paired with each mood, for a subset of the possible combinations. "Participants were fairly active in their estimation of menopausal women with positive moods, but greatly overestimated menopausal women with negative moods."

Discussion

The authors concluded that their results "represent the first experimental demonstration of the effect of

induced mood on the processing of information pertaining to social groups."

The data are not presented in such a way that subjective f coefficients can be inferred.

Match, J. J. (1974). Modification of the illusory correlation phenomenon in clinical judgment. Dissertation Abstracts International Vol 34(9-B) 4669.

McArthur, L. Z.(1980). Illusory causation and illusory correlation: Two epistemological accounts. Personality & Social Psychology Bulletin, 6, 507-519.

Not an empirical paper. McArthur contrasts Brunswik and Gibson, and comes down on the side of direct perception. The author takes a position very similar to Kareev, Lopes and others, who see "illusory correlation effects as mediated by the preparedness to detect associations having adaptive significance" and says that "it may be that type 1 errors are less maladaptive than the type 2 errors which might result were it not for this preparedness."

McArthur, L. Z. Friedman, S. A. (1980). Illusory correlation in impression formation: Variations in the shared distinctiveness effect as a function of the distinctive person's age, race, and sex. Journal of Personality & Social Psychology, 39, 615-624.

McConnell, A. R. (2001). Implicit theories: Consequences for social judgments of individuals. Journal of Experimental Social Psychology, 37, 215-227.

This was an investigation of the influence of individual differences in implicit theories regarding the tendency of people who saw others as being composed of static, fixed traits (entity theorists) vs. those who saw others as dynamic and malleable (incremental theorists) on IC. The link was the established relation between on-line and memory based processing of information, with the former known to produce little IC and the latter known to be associated with IC.

Experiment 1

The implicit personality theories of 50 Intro Psych student were assessed via a questionnaire. The Ss were presented with behaviors with a data structure of (A=16, B=8, C=8, D=4) about two individuals. Memory set instructions were used. The dependent variables were free recall, frequency estimates (Ss were given the n of statements about each person), and likability estimates. The free recall data showed that the implicit personality theory questionnaire separated the groups as expected. The likability ratings showed an IC effect, as did the frequency ratings. The incremental theorists showed a positive f , ($f = .09$, $p < .01$) but the entity theorists did not ($f = .01$, ns).

McConnell, A. R., Leibold, J. M., & Sherman, S. J. (1997). Within-target illusory correlations and the formation of context-dependent attitudes. Journal of Personality and Social Psychology, 73, 675-686.

This is not so much a study of illusory correlation as it is a study using the paired distinctiveness illusory correlation paradigm to investigate something else, viz., multiply categorizable objects. That is, they accept "the validity of the illusory correlation process in accounting for the development of differential impressions of social targets..." They also assert that this study is "the first to investigate the illusory correlation process as it might operate in the differential perception of a single social target as a function of different contexts..."

McConnell, A.R. Sherman, S.J., & Hamilton, D. L. (1994a). Illusory correlation in the perception of groups: An extension of the distinctiveness-based account. Journal of Personality and Social Psychology, 67, 414-429.

The question asked was whether stimuli had to be distinctive at encoding or whether postencoding

processes could produce the same kind of bias. In exp 1 the B- items had serial positions that were either primacy or recency related. One early in the list could not be perceived at encoding as distinctive. DVs were free recall, cued recall, frequency estimates of A- and B-, and likability ratings. No effect of manipulating primacy and recency on IC, which argues against the standard paired distinctiveness explanation which holds that the effect occurs at the encoding stage. The authors proposed an extended distinctiveness based explanation, which allowed the distinctiveness to be produced post-encoding. Exp 2 produced evidence against Fiedler's and Smith's models of IC. Experiments 3, 4 & 5 ruled out an alternative explanation

McConnell, A.R. Sherman, S.J., & Hamilton, D. L. (1994b). On-line and memory-based aspects of individual and group target judgments. *Journal of Personality and Social Psychology*, 67, 173-185. Predicted that IC would result when Ss process information in a memory-based fashion, but no bias or even a reversal would occur when Ss made judgments on-line. 150 intro psych students served in a 3 (instruction set) X 2 (group vs. individual target) design. The data structure was 16:8:8:4. The dependent variables were free recall, cued recall, frequency estimates and likability ratings. The data were not presented in such a way that the actual f coefficients could be extracted; rather indexes were calculated showing the greatest amount of illusory correlation favoring the majority (regardless of target) occurred under instructions that the Ss were to assess the comprehensibility of the sentences and for group targets, relative to individuals. The IC effect occurred for all measures under these instructions, but not consistently for other instruction sets. This paper was dedicated more to the explication of on-line vs. memory based judgments than to IC itself, though using an IC paradigm.

McConnell, A. R., Sherman, S. J., & Hamilton, D. L. (1997a). Within-target illusory correlations and the formation of context-dependent attitudes. *Journal of Personality and Social Psychology*, 72, 414-429.

McConnell, A.R. Sherman, S.J., & Hamilton, D. L. (1997b). Target entitativity: Implications for information processing about individual and group targets. *Journal of Personality, & Social Psychology*, 72, 750-762.

Entitativity refers to "the perception that a social aggregate is perceived as having 'the nature of an entity, of having real existence."

Experiment 1

Not an IC study;

Experiment 2

Exp 2 explored the relation between entitativity and IC. 162 intro psych students serves as Ss in a 3 (target expectancy) X 3 (target type) factorial. The target expectancy instructions were none, and high vs. low entitativity (similar vs. diverse members). The target type instructions were individual, groups with individual names, vs. groups without individual names). The data structure was 16:8:8:4. The dependent variables were free recall, frequency estimates and likability ratings.

McDonald, J. (1998). 200% probability and beyond: The compelling nature of extraordinary claims in the absence of alternative explanations. *Skeptical Inquirer*, 22, 45-49, 64.

McGarty, C., de la Haye, A. (1997). Stereotype formation: Beyond illusory correlation. In R. Spear, P. J. Oakes, N. Ellemers & S. A. Haslam (Es.) *The social psychology of stereotyping and group life*. Cambridge, MA: Blackwell.

As the title suggests, this paper is more about the relation between IC and stereotyping. The authors

argue that IC may be involved in stereotyping, but that other processes are involved and that most of the IC explanations do not relate to stereotyping. Reviews theories of IC and criticisms of the distinctiveness account. They reviewed influences:

own position - Spears & colleagues
 n of groups - Sherman, Hamilton & Roskos-Ewoldson
 impression formation - Pryor

group
 individuals

information loss due to regression effects - Fiedler
 self included in group - Schaller & Maass
 specific expectancies - Hamilton & Rose
 general expectancy that there is a relationship makes it harder to see that there is none
 Peterson

They also mentioned some influences:

IC relates to differentiation between social groups
 IC paradigm has information about real evaluative differences
 conclude that IC is overdetermined, and can be attributed to the "normal sense-making processes involving differentiation between groups which can be seen as both sensible and logical in the unusual contexts in which subjects are asked to make judgments." (p. 169)

McGarty, C., Haslam, S. A., Turner, J. C., & Oakes, P. J. (1993). Illusory correlation as accentuation of actual intercategory difference: Evidence for the effect with minimal stimulus information. *European Journal of Social Psychology*, 23, 391-410.

Notes that 3 dependent variables are commonly used: cued recall, trait ratings, recall of cell frequencies. Also notes that there have been three main classes of explanation: biased encoding (distinctiveness), sampling from memory, and regression to the mean.

The authors rule out several of the above explanations of IC (especially distinctiveness and exemplar based) by showing Ss multiple statements about individuals, telling Ss that there were 2 groups, A and B, but Es did not label the stimulus statements as to which group the hypothetical maker of the statement belonged. They got very strong IC effects, especially in exp 2 in which the Ss saw all statements before they had to make any response.

McGarty et al. postulate that the data are best explained by "the principle of meta-contrast in a manner that maximizes both between-category difference and within-category similarity. The explanation appears to me to be a case of saving the appearances of rationality, especially the last two sentences of the ms.*

McGill, A. L. (1998). Relative use of necessity and sufficiency information in causal judgments about natural categories. *Journal of Personality & Social Psychology*, 75, 70-81.

Not an IC study, but an AC study, in which very small frequencies were used after a single vignette (total n = 7). The author was interested in determining the relative influence of necessity (lack of necessity is marked by an entry in cell B) vs. sufficiency (lack of sufficiency is marked by an entry in Cell C). McGill found the degree of acceptance of causal explanation is influenced by necessity vs. sufficiency depends on whether the categories are natural or not. Since her methods hinged on the presence vs. absence of entries in a cell, I don't think the data are relevant at all to IC, but the conception

in terms of natural vs. artificial categories may be.

McKenzie, C. R. M. (1994). The accuracy of intuitive judgment strategies: Covariation assessment and Bayesian inference. *Cognitive Psychology*, 26, 209-239.

McNally, R. J., & Heatherton, T. F. (1993). Are covariation biases attributable to a priori expectancy biases? *Behavior Research and Therapy*, 31, 653-658.

Meehan, A. M., & Janik, L. M. (1990). Illusory correlation and the maintenance of sex role stereotypes in children. *Sex Roles*, 22, 83-95.

Ss were 33 second graders and 34 fourth graders. Stimulus materials were line drawings of males and females engaged in tasks rated as traditionally masculine, feminine or neutral. The drawings were presented either once or three times. The DV was a frequency estimation task; the children were shown drawings that had appeared either not at all, once or twice, and asked to estimate how many times they had seen them. The results showed an IC in that traditional drawings shown 3 times were judged as having been shown significantly more often than nontraditional ones.

Meiland, P.A. (1996). The effects of mood, gender, and need for cognition on distinctiveness-based stereotyping. *Dissertation Abstracts International: Section B: The Sciences & Engineering Vol 56 (11-B) 6466.*

Meiser, T., & Hewstone, M. (2001). Crossed categorization effects on the formation of illusory correlations. *European Journal of Social Psychology*, 31, 443-466.

Merckelbach, H., Van den Hout, M. A., & de Jong, P. (1989). Psychometrische en elektrodermale aspecten van het illusionaire correlatie-fenomeen: Enkele paradoxale gegevens. *Psychologica Belgica*, 29, 135-148.

Meyer, J., & Shinar, D. (1992). Estimating correlations from scatterplots. *Human Factors*, 34, 335-349.

Mowrey, J.D., Doherty, M. E., & Keeley, S. M. (1979). The effect of negation and task complexity on illusory correlation. *Journal of Abnormal Psychology*, 88, 334-337. Three studies manipulating negation and a fourth manipulating task complexity are reported. Expectancy that a relationship existed was manipulated in exp 2 by telling Ss that half of them would be in a condition that had no relationship in the data. The data structure was a 6 X 4 factorial combination of Rorschach-like signs and common disorders. Dependent variables were first, a simple yes/no question, with a space for elaboration. The second described the signs and asked Ss to rate the likelihood of each disorder given the sign. The third entailed asking Ss to make a diagnosis given 10 new slides. Very strong ICs were found in all three studies. Negation did not matter.

A fourth study showed that reducing complexity attenuated IC but did not eliminate it.

Mullen, B., & Johnson, C. (1990). Distinctiveness-based illusory correlation: A meta-analytic approach. *British Journal of Social Psychology*, 29, 11-27.

This meta-analysis concludes that the IC effect is highly statistically significant, but of moderate strength. The authors discuss several influences on IC, and look for cognitive, non-motivational sources thereof.

1. distinctiveness, which they believe leads to availability

2. valence of the distinctive behavior - negative leads to IC more strongly than +
3. expectancies
4. memory load; the greater the more IC
5. impression formation instructions
6. whether the dv involves estimation (e. g., recall) or assignment (e. g., assign a behavior to a group).

They also discuss strategies.

Mullen, B., & Johnson, C. (1995). Cognitive representation in ethnophaulisms and illusory correlation in stereotyping. *Personality & Social Psychology Bulletin*, 21, 420-433.

Proportionate sizes of in and outgroups exert an effect on cognitive mechanisms, makes smaller group more salient. Leads to distinctiveness-based IC. The authors admit that there may be other sources of IC, but state that "the available evidence strongly supports the distinctiveness explanation."

Exp 1

They found a significant IC effect with negative valence stimulus materials for the target (smaller) group, and a path analysis showed that the IC was a strong predictor of evaluation (assessed on a like/dislike scale) of the target group.

Exp 2

Replicated the above effects with positive statements for the smaller group, but with a weaker IC, as expected

Exp 3

Group size was held constant, but there were more + than - statements for both groups. Saliency was manipulated by instructions rather than relative size, and the same effects were obtained.

The discussion argues that the data are inconsistent with Smith's exemplar based explanation of IC, as well as with Fiedler's explanation in terms of regression to the mean. explores unintended implications of IC due to enhancing saliency. (see p. 432)

Mutter, S. A. (2000). Illusory correlation and group impression formation in young and older adults. *Journals of Gerontology: Series B: Psychological Sciences & Social Sciences*, 55B, P224-P237. ???????

Mutter, S. A., & Pliske, R. M. (1994). Aging and illusory correlation in judgments of co-occurrence. *Psychology & Aging*, 9, 53-63.

This is a multi experiment paper, with the first two experiments using Rorschach-like materials in a factorial design with expectancies for a relationship before and after the data presentation. The third study used word lists. Significant IC effects were found, but the contribution of the study was that age was shown to influence the strength of the IC effect. Older adults memory for confirming information was better than for disconfirming information.

Nisbett, R., & Ross, L. (1980). Human inference: Strategies and shortcomings of social judgment. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Chapter 5 of Nisbett & Ross is entitled "Assessment of Covariation," and presents a discussion of IC. The authors review the early literature, and note that "almost exclusive reliance on the "present/present" cell seems to be a particularly common failing." They do note that other strategies have been observed. They relate IC to examples in everyday thinking, but that everyday assessments of covariation is much more complex and perhaps poorer than the laboratory phenomena. They note a distinction between data-driven and theory-driven, and present data from Jennings, Amabile & Ross showing that data-driven judgments of actual correlations are radical underestimates, but theory driven judgments can be overestimates. Subjective r is related to objective r as the coefficient of alienation. They contrast IC and AC with conditioning phenomena, and relate AC to the perception of personal consistency. Finally, the authors explore how people can have valid relationships in their beliefs even if their AC is so faulty.

Oakes, P. J. Haslam, S. A., & Turner, J. C. (1994). Stereotyping and social reality. Oxford: Blackwell.

Oehman, A., & Mineka, S. (2001). Fears, phobias, and preparedness: Toward an evolved module of fear and fear learning. Psychological Review, 108, 483-522.

Oskarsson, A. T., Hastie, R., & McClelland, G. H. (2002). Perceiving correlations: Could racial profiling be the result of flawed statistical reasoning? Poster presented at the annual meeting of the Psychonomic Society, Kansas City, Kansas.

The investigators use an attitude neutral task, 100 computer-presented, 3-attribute cartoon cars and could search to see if the car had a star inside. The key attribute was color. The data structure was varied. When $r = 0$, people perceived one. If $r > 0$, people overestimated it. The investigators concluded that their results were inconsistent with frequency-based IC, and consistent with "a positive-negative, present-salience based form" of IC.

Over, D. E., & Green, D. W. (2001). Contingency, causation, and adaptive inference. Psychological Review, 108, 682-684.

Not an experimental paper, but it shows that heuristics such as natural sampling can be misleading. The paper shows that if the events represented in a 2 X 2 table are common rather than rare, cells c and d are critical.

Pauli, P. W., & Georg Montoya, P. (1998). Covariation bias in flight phobics. Journal of Anxiety Disorders, 12, 555-565.

Pauli, P., Montoya, P., & Martz, G. (1996). Covariation bias in panic-prone individuals. Journal of Abnormal Psychology, 105, 658-662.

Peterson, C. (1980). Recognition of noncontingency. (1980). Journal of Personality, & Social Psychology, 38, 727-734.

The author shows that people can recognize noncontingency if noncontingency is made a choice in a forced choice situation. The Procedure was a classical probability learning one, prediction of the color of a light from that of the previous light.

Pouliot, L., & Cowen, P. S. (2000). La correlation illusoire basee sur la saillance: Generalisation aux stimuli visuels et verbaux sans stereotype. Canadian Journal of Behavioural Science, 32, 144-152.

Primi, C., & Agnoli, F. (2002). Children correlate infrequent behaviors with minority groups: A

case of illusory correlation. *Cognitive Development*, 17, 1105-1131.

Pryor, J. B. (1986). The influence of different encoding sets upon the formation of illusory correlations and group impressions. *Personality & Social Psychology Bulletin*, 12, 216-226.

Pryor compared impression formation and memory set instructions with regard to their effect on several measures of IC. The study was largely a replication of Hamilton & Gifford (1976) with two instructional sets and an elaboration of the dependent variable set, as well as using 39 trait names instead of behaviors. The data structure was (A=18, B=9, C=8, D=4). The hypothesis was that the memory set would lead to greater IC on a number of different dependent variables. There was a recognition task with 78 trait names, which included foils that had not been in the original set of 39, Ss were also given the original 39 trait names and asked to assign them to groups, and rated how much they liked each group on 7 point scales. Significant interactions showed that memory set Ss tended to show more IC than impression set Ss across dependent variables, though the effect sizes do not appear to be large. The mean phi coefficient from the frequency measure was .20 ($p < .01$) for the memory set Ss and not statistically significant ($f = .05$) for the impression set.

Pryor, P. L., McGahan, J. R., McDougal, B., Haire, S. M., & Marashi, H. (2000). Association of Need for Cognition with judgments of height, weight, and body fat covariation. *Psychological Reports*, 87, 1147-1157.

Pryor, J. B., & Stoller, L. M. (1994). Sexual cognition processes in men high in the likelihood to sexually harass. *Personality & Social Psychology Bulletin*, 20, 163-169.

Ss were 117 male undergraduates. Measured IC in high and low likelihood to harass (LHS) males. The IC task involved serial presentation of 4 sets of 9 pairs of words, presented twice. The crucial pairing involved dominance words paired with sexuality words, with 3 other sets for comparison. The high LHS men were more confident about their recognition than the low LHS men about the dominance-sexuality pairs, but not about the 3 other pairings. High LSH men showed a statistically significant $f = .09$ for the dominance-sexuality pairs but not the other 3, and the dominance-sexuality f for the the high LHS men was significantly higher than for the low LHS Ss.

Pury, C. L. S., & Mineka, S. (1997). Covariation bias for blood-injury stimuli and aversive outcomes. *Behaviour Research & Therapy*, 35, 35-47.

Regan, D. T., & Crawley, D. M. (1984, August). Illusory correlation and stereotype formation: Replication and extension. Paper presented at the American Psychological Association Convention, Toronto, Canada.

Rehm, J. (1988). Welchen Beitrag leistet das Konzept der Zusammenhangstaeuschung ("illusory correlation") zum Erkenntnisfortschritt in der Stereotypenforschung? *Zeitschrift fuer Sozialpsychologie*, 19, 236-242.

Rescorla, R. A. (1968). probability of shock in the presence and absence of CS in fear conditioning. *Journal of Comparative and Physiological Psychology*, 66, 1-5.

Robertson, D. U. (1981). The effect of prior belief on relationship judgments: Analysis of the illusory correlation effect. Doctoral dissertation No. 709. Bowling Green State University.

Robertson compared two hypotheses about IC. One was the bias hypothesis, which he describes as follows: Ss will report unrelated joint events to be related if they think should be related. The distraction hypothesis is that Ss will be insensitive to real correlations that do not square with prior beliefs (he called such relationships NICs) if illusory correlations are present in the data.

Experiment 1

There were two factors: degree of relationship in the ICs and NICs (strong negative, zero and strong positive), and whether ICs were present when NIC varied. Intro psych students ($n = 167$) served as Ss. There were multiple DVs, including yes/no and estimation of event frequencies. The one condition with a zero r had a data structure of 3:9:9:27. There were two contrived sets of 48 cue-symptom pairs in a Rorschach environment. Prior beliefs were assessed via a questionnaire. 41% of Ss in the zero condition replied yes to the yes/no question. The bias hypothesis was supported; the distraction hypothesis was not, but was not adequately tested.

Experiment 2

This study assessed only the distraction hypothesis, with 56 upper level and psych grad students. 20% of the Ss in the zero condition replied yes to the yes/no question.

Rosen, G. M. (1975). On the persistence of illusory correlation associated with the Rorschach. *Journal of Abnormal Psychology*, 84, 571-573.

Not an IC study as such, but an investigation of the associative connections among the experimental materials used by Chapman (1969). Rosen concluded that there was confounding in the Chapmans' task because the "valid percepts ... used by Chapman & Chapman were, in fact, less strongly associated to a single response category than were the invalid percepts...."

Ross, L. (1977). The intuitive psychologist and his shortcomings: Distortion in the attribution process. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 174-220). New York: Academic Press.

Rothbart, M. (1981). Memory processes and social beliefs. In D. L. Hamilton, (Ed.). *Cognitive processes in stereotyping and intergroup behavior*. (pp. 145-181). Hillsdale, NJ: Lawrence Erlbaum Associates.

Not presented as an IC study, but a similar paradigm. The data showed that "subjects have superior recall for behavioral events that conform prior expectancies, but provide on evidence of heightened recall for disconfirming instances."

Rothbart, M., Evans, M., & Fulero, S. (1979). Recall for confirming events: Memory processes and the maintenance of social stereotypes. *Journal of Experimental Social Psychology*, 15, 343-355.

Rothbart, M., Fulero, S Jensen, C., Howard, J., & Birrell, P. F. (1978). From individual to group impressions: Availability heuristics in stereotype formation. *Journal of Experimental Social Psychology*, 14, 137-255.

Sanbonmatsu, D. M. (1991). Personal communication.

List of behavioral descriptions used in Sanbonmatsu, D. M., Sherman, S. J., & Hamilton, D. L. (1987). Illusory correlation in the perception of individuals and groups. *Social Cognition*, 5, 1-25.

Sanbonmatsu, D. M., Posavec, S. S., Kardes, F. R., & Mantel, S. P. (1998). Selective hypothesis testing. *Psychonomic Bulletin and Review*, 5, 197-220.

Not an empirical paper. A brief section is devoted to IC, which says simply that IC is due in part to selective hypothesis testing, i.e., defined by serial testing of focal hypotheses.

Sanbonmatsu, D. M., Shavitt, S., & Gibson, B. D. (1994). Salience, set size, and illusory

correlation: Making moderate assumptions about extreme targets. *Journal of Personality and Social Psychology*, 66, 1020-1033.

As the title implies, this paper explores the hypothesis that salience and set size influence relative recall and judgmental confidence, hence mediate the effects of target descriptions in IC.

Exp 1

111 undergraduates read 10 sentences about each of three target persons. In the extremely favorable condition, the 3X2 matrix was 8:8:8:2:2:2; in the moderate condition it was 6:6:6:4:4:4. There were 4 dependent variables, frequency estimates (used to assess f), relative evaluation, judgmental confidence and recall. Ss in the extreme condition had a significant mean $f = .14$, for the moderate condition mean $f = 0$. (The f coefficient was calculated by collapsing the estimated frequencies for the nonfocal target.) The other DVs showed the same pattern.

Exp 2

164 undergraduates evaluated either 2 or 4 apartments, the number of statements about each being either 6:2, 12:4 or 6:0. A number of manipulations were intended to attenuate IC from the 6:6:6:6:2:2:2:2 baseline condition, for which the f coefficient was .25. Three of the manipulations intended to reduce IC did so, a fourth did not, but the obtained ICs were not tested against 0.

A major part of the paper is devoted to a mediation analysis, which produced a path description: target description -> relative recall -> judgmental confidence -> f and evaluations.

Sanbonmatsu, D. M., Shavitt, S., & Sherman, S. J. (1991). The role of personal relevance in the formation of distinctiveness-based illusory correlations. *Personality and Social Psychology Bulletin*, 17, 124-132.

Primary goal was to examine the impact of personal relevance on distinctiveness-based IC. The investigators expected that making the information personally relevant (Ss could choose which of two pens they wanted after processing sentences about them) would lead to on-line processing and deeper processing, which would attenuate IC. Secondary purpose was to demonstrate effect of IC on behavior, i.e., the choice of the pen. Ss were 56 undergraduates, and were in either of two conditions of personal relevance, high and low. The sentences were 12:6:6:3. Frequency estimates led to a significant $f = .11$ ($p < .01$) for the low relevance condition, vs. $f = .02$ for the high relevance condition (ns). Preference ratings and brand choices were consistent with predictions and with the subjective f values calculated from the recalled cell frequencies. The study demonstrated a specific limitation to IC, reinforced the idea that on-line processing attenuates IC, and showed that IC had behavioral consequences.

Sanbonmatsu, D. M., Shavitt, S., Sherman, S. J., & Roskos-Ewoldsen, D. R. (1987). Illusory correlation in the perception of performance by self or a salient other. *Journal of Experimental Social Psychology*, 23, 518-543.

Sanbonmatsu, D. M., Sherman, S. J., & Hamilton, D. L. (1987). Illusory correlation in the perception of individuals and groups. *Social Cognition*, 5, 1-25.

Schaller, M. (1991). Social categorization and the formation of group stereotypes: Further evidence for biased information processing in the perception of group-behavior correlation. *European Journal of Social Psychology*, 21, 25-35.

Schaller, M., & Maass, A. (1989). Illusory correlation and social categorization: Toward an integration of motivational and cognitive factors in stereotype formation. *Journal of Personality &*

Social Psychology, 56, 709-721.

Schuette, R. A. (1997). Interpersonal power and illusory correlation. Dissertation Abstracts International: Section B: The Sciences & Engineering Vol 57(7-B) 4786.

Schustack, M. W. (1988). Thinking about causality. In R. J. Sternberg & E. E. Smith (Eds). The psychology of human thought. pp. 92-115. New York: Cambridge University Press.

This chapter is a general review of the literature on covariation and causation. Schustack asserts that there are three problems with normative models: they ignore 1. hypothesis generation, 2. the incompleteness of data, and 3. cognitive limitations. There is a brief review of illusory correlation, tying it to confirmation bias.

Schustack, M. W. & Sternberg, R. J. (1981). Evaluation of evidence in causal inference. Journal of Experimental Psychology: General, 110, 101-120.

Not an IC study. Ss were presented causal hypotheses and data relevant to the hypothesis, but the data consisted of only a small number (2-5) of observations. In the first experiment, the hypothesized cause and outcome were either always present or always absent (i.e., only cells A and D were presented.). In the example given for exp 3 - concrete, it appears that only cells B and D were present, but in the set of problems in exps 2 and 3, "all possible relations between target and outcome were permitted." The dependent variable was a subjective posterior probability. In the "base rate" version of exp 3, no cell data were given. The authors found that the Ss could be modeled well by a linear model, but showed many of the usual cognitive biases.

Seggie, J. L., & Endersby, H. (1972). The empirical implications of Piaget's concept of correlation. Australian Journal of Psychology, 24, 3-8.

60 student nurses served as Ss. The stimuli were cards concerning a hypothetical disease. Ss observed 100 cards representing hypothetical patients, then made a response concerning a single hypothetical patient. There were 6 groups, 3 with uncorrelated data, 3 with correlations. The task involved what action to take, given that the patient had a disease. The responses appeared to be heavily utility driven, with nonsignificant c^2 values in all three zero correlated condition and significant in the other three, depending on the consequences.

Shaklee, H. (1983). Human covariation judgment: Accuracy and strategy. Learning and Motivation, 14, 433-448.

This is not an empirical study, but a nice overview of issues in covariation assessment as of 1983. She notes that "false expectations about event relationships would undermine one's ability to predict and/or control the potentially important events in life," and points out that correct covariation judgments may be the product of decision processes as flawed as those leading to judgment errors." The section subtitled EVALUATING JUDGMENT ACCURACY indicates that some studies have asked Ss the direction of relationship, some have asked for the strength, some have asked for both, and some have asked for point estimates, which she criticized as assuming that Ss may have response scales with different units than the statistical criterion. The section subtitled STRATEGY AND ACCURACY deals with the conceptions of accuracy, such as cell A, sum of diagonals, etc. DEFINING JUDGMENT STRATEGIES ranges over methods of identifying strategies used by Es, including asking Ss to describe their strategies and creating hierarchically organized sets of problems so that optimal strategies would get them all correct but suboptimal ones would get only predictable subsets correct. The final substantive section, DETERMINANTS OF COVARIATION JUDGMENT STRATEGY, lists work load, instructions, response format, complexity, and.

Shaklee, H., & Hall, L. (1983). Methods of assessing strategies for judging covariaion between events. Journal of Educational Psychology, 75, 583-594.

Not an IC study, but has IC conditions. The authors describe 4 possible strategies, (cell A, A vs. B, sum of diagonals, and the normative conditional probability strategies), then describe a set of 12 problems designed to provide a diagnosis of which strategy subjects use. 116 undergraduate students served as Ss, judging all 12 problems. Each problem was presented as a 2 X 2 table, with a total of 24 for the cell frequencies.

The most frequently used strategies were A vs. B and conditional probability. 36% and 32% of Ss, respectively. Males tended to use more sophisticated strategies. Ss recognized the conditional probability strategy as better than their own, when the several strategies were described. There was poor agreement between the strategy as diagnosed by responses to the 12 problems and the Ss' descriptions of their strategies.

The data were not presented in such a way that the responses to the zero correlated arrays could be extracted for purposes of assessing whether the Ss showed IC.

Shaklee, H., & Mims, M. (1981). Development of rule use in judgments of covariation between events. *Child Development*, 52, 317-325.

Shaklee & Mims describe four different judgment strategies in increasing complexity: cell A, A vs. B, sum of diagonals and comparison of conditional probabilities. The 12 AC problems were hierarchically organized, such that a problem solve correctly by a simple strategy would also be solved correctly by a more complex strategy, but not vice versa. Three of the 12 problems had $f = 0$, and one had $f = .07$, which the authors classed as noncontingent. The Ss were 4th, 7th and 10th graders and college students. The problems were presented as 2X2 matrices, after a cover story for each had been read. The response was a 3 point scale phrased in terms of more likely, equally likely, less likely. Accuracy, defined as the sum (0 - 3) for each problem type, increased with age, as did the complexity of strategy use. No 4th grader used the conditional probability strategy; 38% of college students did. 8% of 4th graders used the cell A strategy, but no college student did. The data presentation does not allow analysis of the $f = 0$ conditions.

Shaklee, H., & Mims, M. (1982). Sources of error in judging event covariations: Effects of memory demands. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 8, 208-224.

Begins by defining 4 AC strategies: cell A, cell A vs. cell B, sum of diagonals and conditional probabilities. There were 3 conditions: frequency (Ss recorded instances in a 2X2 table as they were presented), memory-frequency (Ss estimated frequencies once they were over), and memory (made no records or frequency estimates, only judge relatedness after the sequence was over)

Experiment 1

Ss judged 12 problems designed to be diagnostic of the strategy used. In 4 of the problems the f was zero or very close to it. The 24 stimuli were presented sequentially on slides. The DV was a 9-point scale of likelihood for (e.g.) the plant to be healthy when they get plant food. 111 intro psych students served in a between design. Relatively few Ss used a cell A strategy (2.7%), or were unclassifiable (10.8%). The modal strategy was cell A vs. cell B (35.4%), with the sum of diagonals and conditional probability strategies being a little above 20%. The authors concluded that "subjects are quite poor at judging event covariations if those judgments are based on their memory for the frequency information."

Experiment 2

This study was designed to increase the complexity of the task by having some Ss asked to remember the number of times a slide had a mark in the corner as well as the cell frequencies. There were 3 conditions: no distractor, distractor - 2 (remember the number of marks in each the two top corners), and

distractor - 4 (remember the number of marks in each the four corners). 129 Ss served in three between conditions. Again there were 12 problem sets, similar to those in exp 1. Performance was substantially worse than in exp 1. The modal strategy was cell A vs. cell B (36%), with the sum of diagonals being next (17%). Cell A was more common than the conditional probability (11.7% to 4.7%), with 27% of Ss being unclassifiable.

In neither study are the data of the zero correlated problems separated out from the overall data.

Shaklee, H., & Tucker, D. (1979). Cognitive bases of development in inferences of ability. *Child Development*, 50, 904-907.

Not an IC study.

Shaklee, H., & Tucker, D. (1980). A rule analysis of judgments of covariation between events. *Memory and Cognition*, 8, 459-467.

Shaklee, H., & Wasserman, E. A. (1986). Judging interevent contingencies: Being right for the wrong reasons. *Bulletin of the Psychonomic Society*, 24, 91-94.

Shanks, D. R., & Dickinson, A. (1987). Associative accounts of causality judgment. In G. H. Bower (Ed.), *The psychology of learning and motivation* (pp. 229-264). New York: Academic Press.

Shapiro, P. N. The illusory correlation of distinctiveness: Another mechanism in the origin of stereotyping. *Dissertation Abstracts International Vol 47(7-B) 3163 1987*

Shavitt, S., Sanbonmatsu, D., M. Smittipatana, S., & Posavac, S. S. (1999). Broadening the conditions for illusory correlation formation: Implications for judging minority groups. *Basic & Applied Social Psychology*, 21, 263-279.

Sherman, S. J., Corty, E. (1984). Cognitive heuristics. In R. S. Wyer, Jr., & T. K. Srull (Eds.), *Handbook of Social Cognition*, (Vol. 1, pp. 189-286). Hillsdale, NJ: Erlbaum.

Sherman, S. J. Hamilton, D. L., & Roskos-Ewoldsen, D. R.(1989). Attenuation of illusory correlation. *Personality & Social Psychology Bulletin*, 15, 559-571.

4 conditions. One replicated Hamilton & Gifford. The other 3 conditions had a third group C with varying frequencies in order to see if the presence of a third group would reduce the distinctiveness of group B, thereby attenuating the IC effect. DVs were assignment, then estimation, then evaluation. Overestimation of cell D was present in all groups, but was attenuated in two groups with especially high cell D frequencies. Mean f values were quite low. The effect of Group C was on the estimations and evaluations of Group B. Interesting implications for the attenuation of stereotyping and bias.

Shweder, R. A. (1977). Likeness and likelihood in everyday thought: Magical thinking about personality. *Current Anthropology*, 18, 637-658.

Distinguishes between intuitive (e.g., object permanence) and nonintuitive concepts, and restates the position that there is a "universal disinclination of normal adults to draw correlational lessons from their experience, coupled with a universal inclination to seek symbolic and meaningful connections (likenesses) among objects and events." He labels the latter "magical thinking." Provides evidence that people do not use their own subjectively held "correlation-relevant frequency information" to reason correlationally. Shweder provides numerous examples from the anthropological literature supporting his contention that "correlation and contingency ... are absent from most ordinary thinking." He notes that it is possible to elicit correlational reasoning from normal adults.

Shweder, R. A. (1977b). Illusory correlation and the MMPI controversy. *Journal of Consulting & Clinical Psychology*, 45, 917-924.

Reanalyses of Newcomb's old data, plus some new data. Argues that the first factor of the MMPI may be an artifact of IC.

Shweder, Richard A.(1977c). Illusory correlation and the MMPI controversy: Reply to some of the allusions and elusions in Block's and Edwards' commentaries. *Journal of Consulting & Clinical Psychology*, 45, 936-940.

Repudiates the criticisms of the above paper by Block and Edwards.

Shweder, Richard A.(1980). Factors and fictions in person perception: A reply to Lamiell, Foss, and Cavenee. *Journal of Personality*, 48, 74-81.

Not relevant to to IC. If I understand this exchange between Shweder and Lamiell correctly, IC in Shweder's and Lamiell's terms refers simply to strengths of beliefs about correspondence between personality traits that are not warranted by data. Hence the usage is quite different from the Chapmans', and refers to a belief that may or may not be due to IC in the Chapmans' sense.

Slusher, M. P., & Anderson, C. A. (1987). When reality monitoring fails: The role of imagination in stereotype maintenance. *Journal of Personality & Social Psychology*, 52, 653-662.

Smedslund, J. (1963).The concept of correlation in adults. *Scandinavian Journal of Psychology*, 4, 165-173.

Smedslund, J. (1966). Note on learning, contingency, and clinical experience. *Scandinavian Journal of Psychology*, 7, 265-266.

Not an empirical study. Smedslund is arguing that clinicians ignore cells A and C, which is tantamount to ignoring the base rate.

Smith, E. R. (1991). Illusory correlation in a simulated exemplar-based memory. *Journal of Experimental Social Psychology*, 27, 107-123.

Not a behavioral investigation, but a computer simulation using the Hintzman model, and assuming that storage and retrieval processes are sufficient to account for IC. The simulation modeled behavior in a situation involving cell frequencies of 18:8:9:4, and also for a 3X3 condition. The simulation produced subjective f coefficients similar to those in the literature, but $f = 0$ for a control (equal group sizes) condition. The model replicated the finding discussed in Hamilton & Sherman (1989) that the IC effect seems is related to biased recall in favor of cell D. Smith argues that the IC effect may be due to Ss encoding of information in frequencies rather than proportions, and that "Since the feature values for the positive and negative behavior types are opposite, this means that the overall response is the algebraic sum of the two, and it will be proportional the the arithmetic difference (not the proportion) of the group's numbers of positive and negative behaviors."

Smither, J. W., Collins, H., & Buda, R. (1989). When ratee satisfaction influences performance evaluations: A case of illusory correlation. *Journal of Applied Psychology*, 74, 599-605.

This paper reports two investigations of the relationship between satisfaction and performance. Experiment 1 is not an IC study in the usual sense, in which Ss are presented, e. g., the 4 cells of a 2X2 table. Rather the Ss were randomly assigned to one of 2 groups, one of which was told that a videotaped lecture was by a highly satisfied instructor, the other was told that the lecture was by a very dissatisfied lecturer. In spite of the fact that it was the same videotape, the Ss rated the performance of the dissatisfied lecturer significantly lower than that of the satisfied one. Experiment 2 had the same character, except that it was an in-basket task, and the design extended to self ratings. The authors concluded that "the illusory correlation between job performance and and job satisfaction may lead to

errors in the performance judgment process."

[Note that the experiment does not really demonstrate IC directly, but rather shows that a manipulation affects a rating, and IC is implicated as an explanation. Note further that this study illustrates nicely Brunswik's concern for the double standard with regard to object sampling vs. subject sampling. Note that there was only one videotape in exp 1 and one in exp 2.]

Snyder, M. (1981). Seek, and ye shall find: Testing hypotheses about other people. In E. T. Higgins, C. P. Herman, & M. P. Zanna (Eds.), Social cognition: The Ontario symposium (Vol. 1). Hillsdale, NJ: Lawrence Erlbaum Associates.

Snyder, M., & Miene, P. K. (1994). Stereotyping of the elderly: A functional approach. British Journal of Social Psychology, 33, 63-82.

Snyder, M., & Swann, W. B., Jr. (1978). Behavioral confirmation in social interaction: From social perception to social reality. Journal of Experimental Social Psychology, 14, 148-162. (a)

Snyder, M., & Swann, W. B., Jr. (1978). Hypothesis-testing processes in social interaction. Journal of Personality and Social Psychology, 36, 1202-1212. (b)

Not an IC study.

Spears, R. Eiser, J. R., & Van der Pligt, J. (1987). Further evidence for expectation-based illusory correlations. European Journal of Social Psychology, 17, 253-258.

37 Ss (no demographic data were supplied) were presented statements with a 9:9:9:9 data structure. The statements were either pro or anti-nuclear and were about towns A and B, and that town A was larger than town B, but that the sample sizes were equal. The response scale asked Ss to assign each statement to one town or the other and to estimate the % of pro and anti nuclear residents in each town. Subjects overestimated cells A and D, and had significant mean transformed f coefficients. The "findings provide further strong evidence for the robustness and generalizability of the expectation-based illusory correlation mechanism."

Spears, R., & Haslam, S. A. (1997). Stereotyping and the burden of cognitive load. In R. Spears, P. J. Oakes, N. Ellemers & S. A. Haslam (Eds.) The social psychology of stereotyping and group life. Oxford, U. K.: Blackwell.

Spears, R., Oakes, P. J., Ellemers N. & Haslam, S. A. (Eds.) The social psychology of stereotyping and group life. Oxford, MA: Blackwell.

Spears, R., van der Pligt, J., & Eiser, J. T. (1985). Illusory correlation in the perception of group attitudes. Journal of Personality and Social Psychology, 48, 863-875.

Spears, R., van der Pligt, J., & Eiser, J. T. (1986). Generalizing the illusory correlation effect. Journal of Personality and Social Psychology, 51, 1127-1134.

The first study was intended to "define the boundary conditions governing the influence of self-relevance as a mediator of illusory correlations." The idea was to define salience in terms of self-relevance, independently of infrequency.

Experiment 1

86 students served as Ss, and had their own attitude toward nuclear power assessed. The Ss were told that the experiment was about people's attitude toward nuclear power in two towns. The Ss were told

that Town A was larger than Town B, hence they would see more data representing Town A than Town B. The data structure was 12:6:12:6. An IC effect was found, but for antinuclear Ss only. The Es hypothesized that the IC effect was limited to antinuclear Ss because of strong prior biases that attitudes toward nuclear power were strongly associated with town size, with small towns being more antinuclear.

Experiment 2

This was a replication of exp 1, with the exact same data structure except than in this study the towns were describes of equal sizes, but that more opinions had been sampled from Town A. Again the data structure was 12:6:12:6. An IC effect was found for both pro- and anti Ss. The IC effects were stronger for Ss with extreme attitudes. The authors concluded that "these studies reveal further evidence for the impact of involvement factors on the illusory correlation bias in addition to those due to prior expectation or shared infrequency."

Stahl, Deborah A. (1982). "Illusory correlation" in the Rorschach: A comparison of interpretations by clinical psychologists and untrained observers. Dissertation Abstracts International Vol 42(12-B, Pt 1) 4944.

Starr, B. J., & Katkin, E. S. (1969). The clinician as aberrant actuary: Illusory correlation and the incomplete sentences blank. Journal of Abnormal Psychology, 74, 670-675.

Three groups of Ss, undergrads, graduate students in clinical and graduate students in psych area other than clinical saw all possible pairings of 5 clinical problems and 5 filled in incomplete sentences. Ss tended strongly to see the sentences filled in in a manner consistent with the beliefs of a group of clinicians; very few reported that the sentences occurred equally often within problem categories.

Strahan, R. F., & Hansen, C. J. (1978). Underestimating correlation from scatterplots, Applied Psychological Measurement, 2, 543-550).

Stroessner, S. J., Hamilton, D. L., & Mackie, D. M. (1992). Affect and stereotyping: The effect of induced mood on distinctiveness-based illusory correlations. Journal of Personality and Social Psychology, 62, 564-576.

Stroessner, S. J., & Plaks, J. E. (2001). Illusory correlation and stereotype formation: Tracing the arc of research over a quarter century. p.247-259 Cognitive social psychology: The Princeton Symposium on the Legacy and Future of Social Cognition. viii, 503pp. ????????

Sugimori, S. (1991). Effects of group size upon proportion judgments of likable and unlikable members and group impressions: Small is bad, not that large is good. Japanese Journal of Experimental Social Psychology, 30, 217-227.

Sugimori, S. (1995). An experimental study on the illusory correlation between population of the group size and attractiveness of group members. Japanese Journal of Social Psychology, 11, 39-50.

Susskind, Joshua Eric (2001). Children's stereotypic biases: Developmental changes in the perception of gender expectancy-based illusory correlations. Dissertation Abstracts International: Section B: The Sciences & Engineering, 61(8-B), 4480.

Sweetland, J. P. (1973). "Illusory correlation" and the estimation of "dangerous" behavior. Dissertation Abstracts International Vol. 33(8-B) 3963-3964.

Thompson, S. C., Armstrong, W., Thomas, C. (1998). Illusions of control, underestimations, and

accuracy: A control heuristic explanation. *Psychological Bulletin*, 123, 143-161.

Titus, W. C. (1983). Illusory correlation based biases in the processing of implicational information. *Dissertation Abstracts International Vol 43(7-B) 2396.*

Tobacyk, J., & Milford, G. (1983). Belief in paranormal phenomena: Assessment instrument development and implications for personality functioning. *Journal of Personality and Social Psychology*, 44, 1029-1037.

Tomarken, A. J., Mineka, S., & Cook, M. (1989). Fear-relevant selective associations and covariation bias, *Journal of Abnormal Psychology*, 98, 381-394.

This study was concerned with whether enhanced conditioning the fear-relevant stimuli may be a manifestation of covariation bias. It was not a typical IC study.

Experiment # 1

45 female volunteers who tested either high or low on fear of snakes or spiders were exposed to 24 slides from each of three categories, one fear-relevant and two neutral. following each slide was either a tone, a shock or nothing, with equal probabilities. Ss completed 9 scales, one each for each combination of slide and outcome. High-fear Ss overestimated the association between fear-relevant stimuli and critical outcomes moreso than did low fear Ss.

Experiment # 2

Exp 2 replicated Exp 1 with 25 female undergrads except that one of the neutral slides was replaced with a highly perceptually salient stimulus. The same results were obtained.

Experiment # 3

This study generalized the results of the first two, using 106 Intro Psych females. It increased the density of shock from 33% to 50% while keeping the slides and outcomes uncorrelated, and introduced a one-week delay between the manipulations and the covariation measures. The high-fear Ss behaved as in experiment 1 with both levels of shock frequency, but the low-fear Ss showed equally high covariation estimates as did the high-fear Ss in the 50% condition. The time delay appears not to have made a difference.

Tomarken, A. J., Sutton, S. K., & Mineka, S. (1995). Fear-relevant illusory correlations: What types of associations promote judgmental bias? *Journal of Abnormal Psychology*, 104, 312-326.

Toneatto, T. (1999). Cognitive psychopathology of problem gambling. *Substance Use & Misuse*, 34, 1593-1604.

Not an empirical paper. The author implicates IC as one factor in problem gambling.

Trolier, T. K., & Hamilton, D. L. (1986). Variables influencing judgments of correlational relations. *Journal of Personality and Social Psychology*, 50, 879-888.

Not an IC study but has a condition that corresponds closely to IC. A computer based 3 (information form - continuous, mixed & symmetric binary) X 3 (expectancy - positive, zero and none) X 2 (high vs. near zero correlation) factorial with 72 undergrads as Ss. Each condition had 36 paired observations. Ss made covariation estimates on a 100 point scale and estimated the frequencies in the 4 cells. The results showed that actual correlation made a difference, as did form of the information. The authors said that the direct covariation estimates did not speak to IC, because the 100-point response scale was not

framed in correlational terms, but the mean judgment on that scale for the zero correlated conditions was 22.25, compared to 60.08 when the correlation was .70. Direct estimates were significantly and substantially higher for the binary presentation. There were huge regression effects in the frequency estimates, with a much flatter distribution of estimated than actual frequencies. A footnote indicates that any responses with a zero cell were discarded, which appears to me to be a mistake, as f could still be calculated as long as there were no zero marginals. When the actual correlation was zero, the mean subjective f was near zero; when the actual correlation was .70, the subjective was radically underestimated for continuous and mixed presentations. There were powerful effects of expectancies and information presentation.

The closest condition to a typical IC study was the binary group with a zero actual correlation. The high expectancy group had a mean f of about .05. Even this group, though, cannot be considered a typical IC group, as Ss were randomly assigned to the order in which the zero and high ecological correlations were presented. Hence, some % of Ss were exposed to the zero arrays after having been exposed to a high positive array.

Turk, D. C. Salovey, P. (1985). Cognitive structures, cognitive processes, and cognitive-behavior modification: I. Client issues. *Cognitive Therapy & Research*, 9, 1-17.

Turk, D. C. Salovey, P. (1986). Clinical information processing: Bias inoculation. 305-323 *Information processing approaches to clinical psychology*. *****

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5, 207-232.

A section of this paper is titled "Frequency of Co-occurrence." In it, Tversky & Kahneman explore the availability heuristic as an explanation for illusory correlation, proposing that "an assessment of the associative bond between two items is one of the processes that mediate the judged frequency of their co-occurrence." They note that repetition, prior association and paired distinctiveness all contribute to associative strength. They present two studies of IC, as well.

Experiment 1 (Their study 9)

A replication of the original Chapman (1967) study on word pairs. 98 Ss were shown 20 word pairs, 10 highly related pairs and 10 unrelated pairs, and given a cued recall task. A second group of 68 Ss was asked for frequency judgments, i.e., how many times each pair had been presented. Both cued recall and frequency judgments showed significant results consistent with IC.

Experiment 2 (Their study 10)

Three independent groups of Ss (203 in all) were presented 16 pairs of personality trait names on tape, 8 highly related and 8 unrelated, in varying frequencies. One group had a cued recall task, another assessed how likely they thought it was that they would recall the target trait, and the third group judged how often they thought each pair had appeared in the tape. More than twice as many highly related traits were recalled was .84, and the highly related pairs were judged to have been more presented frequently than the unrelated pairs.

Tversky & Kahneman took these results as demonstrating that "the phenomenon of illusory correlation is explained as an availability bias."

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185, 1124-1131.

Tweney, R. D., Doherty, M. E., & Mynatt, C. R. (Eds.). (1981). On scientific thinking. New York: Columbia University Press.

van Knippenberg, D, & Spears, R. (2001). The interactive effects of infrequency of occurrence and expectancy on social group representations. *Basic & Applied Social Psychology*, 23, 281-289.

van Knippenberg, D, van Knippenberg, A., & Dijkterhuis, A. (1997). processing goal as a moderator of in-group-serving illusory correlations. *British Journal of Social Psychology*, 36, 427-441.

Vonk, R. (1998). The slime effect: Suspicion and dislike of likable behavior toward superiors. *Journal of Personality & Social Psychology*, 74, 849-864.

Experiments 1,2,3 & 5 are not relevant to IC.

Exp. 4 - "The illusory slime effect"

Vonk hypothesized that the activation of the "slime schema" (people who act in ingratiating ways to superiors and unpleasantly to subordinates are perceived as slimy. Ss, 38 high school students, saw 18 zero correlated behaviors (8,4,4,2) but had a mean significant f by a recall method. Vonk concluded that the mere activation of the slime schema was sufficient to produce an IC, even though there were 3 factors militating against IC:

1. Stimulus materials consisted of a single person rather than multiple group members
2. N of items was small (I don't think that N was all that small.)
3. Impression formation instructions were used.

Waller, W. S., & Felix, W. L. (1987). Auditors' covariation judgments. *The Accounting Review*, 62, 275-292.

Waller, R. W., & Keeley, S. M. (1978). Effects of explanation and information feedback on the illusory correlation phenomenon. *Journal of Consulting & Clinical Psychology*, 46, 342-343.

30 subjects were assigned to each of 4 conditions, explanation, information feedback, explanation and information feedback, and control. Each group was further broken down into 3 subgroups receiving different sets of generalization materials. In a training phase, all subjects were exposed to 3 sets of Rorschach stimuli, with either - 0 and + values of r . Subjects were then given the differential instructions, and tested on one of 3 sets of DAP stimuli, with either - 0, or + values of r . The dependent variable was a 7 point scale of likelihood that the patient had each symptom given a cue. The explanation and feedback had no impact on the illusory correlation given $r = 0$, but did attenuate the illusory correlation effect given negative values of r .

Wampold, B. E., Casas, J. M., & Atkinson, D. R. (1981). Ethnic bias in counseling: An information processing approach. *Journal of Counseling Psychology*, 28, 498-503

Ward, W. C., & Jenkins, H. M. (1965). The display of information and the judgment of contingency. *The Canadian Journal of Psychology*, 19, 231-241.

Not an IC study. Ward & Jenkins studied naive Ss' perception of correlation, and concluded that "statistically naive subjects lack an abstract concept of contingency that is isomorphic with the statistical concept." Only Ss who received a summary alone were reasonably accurate; Ss who received serial presentation alone or serial followed by summary seemed to be using aggregation rules more consistent with inappropriate rules.

Wasserman, E. A. (1987). Detecting outcome-response relation: Toward an understanding of the causal texture of the environment. In G. H. Bower (Ed.), The psychology of learning and motivation (pp. 229-264). New York: Academic Press.

Wasserman, E. A., Chatlosh, D. L., & Neunebar, D. J. (1983). Perception of causal relations in humans: Factors affecting judgments of outcome-response contingencies under free-operant procedures. Learning and motivation, 14, 406-432.

Wasserman, E. A., Dorner, W. W., & Kao, S. F. (1990). Contributions of specific cell information to judgments of interevent contingency. Journal of Experimental Psychology: Learning, Memory, and Cognition, 16, 509-521.

Unusual, perhaps unique, assessments of IC. Exp 1 simply asked Ss to either check whether a cell was necessary to conclude contingency, or to rate them. Both assessments led to the A>B>C>D ordering, although about half the Ss checked that all 4 cells were necessary. Exp 2 presented the Ss with 25 matrices (in list form) designed to permit assessment of cell usage. The analysis involved comparing the ratings of 48 pairs from the 25 problems, selected to reveal whether cell usage was equivalent in the cells, and to assess the degree of cell usage. According to one analysis, the A>B>C>D ordering was found again. According to another analysis, the strategy that most Ss were using was A-B. There was a "strong correspondence between importance estimates and contingency judgments across groups..." but when that correspondence was sought within individuals, none was found. The authors concluded that "clearly, subjects in the present study showed no introspective awareness of their own cognitive processes during contingency judgments, as shown by the lack of correspondence between individual subjects' cell-importance estimates and their contingency-judgment difference scores."

I see the latter finding as related to the dissociation between cell selections and the relatively low incidence of IC in our own data.

Wasserman, E. A., & Shaklee, H. (1984). Judging response-outcome relations: The role of response-outcome contingency, outcome probability, and method of information presentation. Memory and Cognition, 12, 270-286.

This paper reports 4 experiments in which the potential cause is a representation on paper of a tap on a wire and the outcome is a representation of a buzz or not, given a scenario of someone trying to troubleshoot a defective radio.

Experiment 1

552 undergraduate Ss served in a between design, and an additional 25 in a within design. There were 24 problems, each with a different data structure. The f coefficients varied from -1 to +1. The stimuli were presented in a time line, which, to my knowledge is unique to this study. The response was a 9-point linear scale from "prevents sound from occurring" to "causes sound to occur." Both the degree of relationship (assessed by $P(B|T)-P(B|\sim T)$) and the base rate of buzz affected the response, with $P(B|T)-P(B|\sim T)$ accounting for much more variance than $P(B)$. The ratings for the condition $P(B|T)=P(B|\sim T)$ were near zero, on the average, but 3 of the 4 $f=0$ conditions in the within portion of the design were significantly different from 0. None was in the between design. The function relating mean rating to $(B|T)-P(B|\sim T)$ looked remarkably like a traditional overconfidence function.

Experiment 2

34 undergrads served in a within design, with same 24 problems, each S serving in a time line format and in a summary table format. The results for both the time line and table conditions largely replicated

those of exp 1, but there were some differences between the two conditions, especially with negative contingencies.

Experiment 3

25 Ss served in a replication of the time line condition of exp 1, with the only modification being that breaks were put into the time line between "sampling intervals." Again the results were like the above. The main differences in the broken and unbroken conditions were in the asymmetry between the + and - conditions (unbroken Ss had a flatter slope in the function relating mean rating to $P(B|T)-P(B|\sim T)$ than did the broken Ss) and in the similarities to an ideal observer (the broken Ss were somewhat closer to the diagonal).

Experiment 4

160 undergrads served in 4 conditions, two replicating the earlier conditions and two new ones, one in which the Ss were instructed to segment the time line, the other asking Ss to fill in a table after counting the frequencies in the 4 cells. Again there was a powerful effect of $P(B|T)-P(B|\sim T)$ and a weak but significant effect of $P(B)$. There were significant between group differences, but graphically they are pretty similar, with all groups showing closer approximation to the ideal observer on the positive side of 0, but much flatter slopes on the negative side. There was a weak but significant effect of gender, with males being closer to the ideal observer.

The major conclusion that the authors drew is that "judgments of interevent contingency importantly depend on the method of presenting information about event pairings. (My take on the results differs somewhat, in that I see a lot of similarity across conditions.)"

Wasserman, G. S. (1991). Time and duration: A persistent illusion. Perception & Psychophysics, 50, 603-604.

Wasserman, G. S., & Kong, K. (1974). Illusory correlations of brightness enhancement and transients in the nervous system. Science, 184, 911-913.

Wells, G. L., & Windschitl, P. D. (1999). Stimulus sampling and social psychological experimentation. Personality and Social Psychology Bulletin, 25, 1115-1125.

Williams, A. D. (1992). Bias and debiasing techniques in forensic psychology. American Journal of Forensic Psychology, 10, 19-26.

Wills, C. E. (1987). Preparation and procedures for the courtroom: Insight for the licensed professional counselor. TACD Journal, 15, 91-102.

Winkel, F. W. (1990). Crime reporting in newspapers: An exploratory study of the effects of ethnic references in crime news. Social Behavior, 5, 87-101.

Wright, J. C., & Murphy, G. L. (1984). The utility of theories in intuitive statistics: The robustness of theory-based judgments. Journal of Experimental Psychology: General, 113, 301-324.

Yachanin, S. A. (1982). Informal conceptions of relationship. Unpublished manuscript. Department of Psychology. Bowling Green State University.

Yachanin used a unique experimental approach which was neither a selection nor a reception paradigm, rather he asked subjects to construct sets of at least 18 cases that would show either a perfect

relationship or a zero relationship. 52 undergraduate students created mini case studies on cards, using DAP terms, with either 2X2 or 3X3 features and problems. The modal (and correct) responses were data sets with correlations of 1.0 for the perfect correlation task and 0 for the zero task, but there was considerable variability, with 69% of the subjects not giving the modal responses. 27% of subjects correctly constructed data sets for both tasks, and 56% were incorrect on both. Yachanin concluded, based on the constructions, questionnaire responses and on think-aloud protocols, that two general strategies were in play, which he called "Cell-Relations" and "Self-Reference" strategies. The former were those who attended explicitly to the statistical structure they were creating; the latter were those who made "use of stereotypic explanations about the nature of possible causal links between individual feature-problem combinations or any other non-frequency rationalizations." (The figures are missing from the draft that I have of this paper, which makes some results hard to understand.)

Yachanin, S. A. (undated). Folk wisdom: Knowing it to be false, believing it to be true. Unpublished manuscript. Department of Psychology. Bowling Green State University.

This is apparently an earlier draft of Yachanin (1982). It reports the same experimental procedure, but with just 45 Ss. The figure is in this ms., and it shows that 13 of the 45 Ss successfully constructed both zero and perfect relationships. Yachanin, based on subjects descriptions of how they did the constructions and explanations of why zero or perfect data sets represented zero or perfect correlation, concluded that some Ss approached the task as calling for relationships across cases, while others thought about relationships as inhering in each individual case.

Yates, M. C., McGahan, J. R., & Williamson, J. D. (2000). Intuitive covariation assessment of the illusory correlation. Journal of General Psychology, 127, 397-411.

% of Ss saying yes to yes/no dv when the correlation was 0.

Chapman & Chapman (1969) 45%

Golding & Rorer (1972) 55%

Kurtz & Garfield (1978) 55%

Robertson (1981) exp 1 41%

Robertson (1981) exp 2 20%

Methods of Measuring IC:

Evaluation - rate, e.g., the likability of the groups

Cued recall (assignment - give S the original stimulus sentences and ask for group

Estimation - Have S fill in the cell frequencies

Have Ss fill in two cell frequencies and get the others by subtraction

Yes/No answer to question whether there is a relationship

free recall of statements

prediction of Y from X if continuous variables are used and correlating responses with statistical predictions

developing hierarchically organized problem sets designed to be diagnostic

Influences on IC:

cell frequencies

affective processes

cognitive load (Stroessner, Hamilton & Mackie, (1992)

impression formation instructions (reduce IC) (McConnell, Liebold, & Sherman, 1997; Pryor, 1986.)

group membership of Ss

valence of statements (Mullen & Johnson, 1990)

paired distinctiveness

presence of a third group (Sherman, Hamilton, & Roskos-Ewoldsen, (1989.

serial position of B- items (McConnell, Sherman, & Hamilton, 1994a)

instructions (Sanbonmatsu, Sherman & Hamilton, 1987)

self-relevance (Spears, van der Pligt & Eiser, 1986)

memory based or on line (McConnell, Liebold, & Sherman, 1997.)

target entitativity (McConnell, Sherman, & Hamilton, 1997).

group coherence (Berndsen, Spears, McGarty & van der Pligt, 1998)

memory-based vs. on-line judgments (McConnell, Sherman, & Hamilton, 1997).

group vs. individual (Sanbonmatsu, Sherman & Hamilton, 1987).

encoding vs memorial processes (McArthur, 1980)

age (Mutter & Pliske, 1994)

vested interests (Berndsen, Spears & van der Pligt, 1996)

relative group sizes in PD studies (Berndsen, Spears, & van der Pligt, 1996)

reinterpretive processes (Berndsen, Spears, McGarty & van der Pligt, 1996; Berndsen, Spears, & van der Pligt, 1998)

confirmation bias (Spears, van der Pligt, Spears, & McGarty, 1996)

own position - Spears & colleagues

n of groups - Sherman, Hamilton & Roskos-Ewoldson

information loss due to regression effects - Fiedler

self included in group - Schaller & Maass

specific expectancies - Hamilton & Rose

general expectancy that there is a relationship makes it harder to see that there is none

Peterson

Individual differences influences on IC:

circadian rhythm (Gordon, 1997)

need for structure (Gordon, 1997)

gender effects (Basow, et al., 1989)

one fourth of Ss in Fiedler, Hemmeter & Hofmann drove the group effect

Shown not to be influences on IC:

number of repetitions of stimuli (Fiedler, Hemmeter & Hofman)

reducing time pressure (Chapman & Chapman, 1967)

Theories of IC

paired distinctiveness

overestimation of Cell D

regression

expectations

prototype formation (Johnson & Mullen, 1993)

Schematic processing (Hamilton, 1981)

resemblance - "magical thinking" - (Shweder, 1977a)

Availability (T & K), 19XX).

sense-making (McGarty, et al.)

A>B>C>D (Arkes & Harkness, 1983; Crocker, 1982; Schustack & Sternberg, 1971; Shaklee, 1983; Wasserman et al., 1990)

density (Fiedler)

Implications of IC

Stereotyping (Hamilton & Gifford (1976; numerous successors)

Data-based IC may be implicated in the development of stereotypes and expectancy- based IC may be implicated in the naintenance of stereotypes (Berndsen et al., 1996)

interpretation of personality tests - (Shweder, 1977b,c)

Implications - perception of consistency in personality

gender differences (Basow, et al., 1989)

Dependent variables

assignment

"projective assignment" (Berndsen et al.2001)

trait ratings

predictions

estimation

looking time

psychophysiological

think-aloud protocols (Berndsen et al.2001)

prediction of Y from X if continuous variables are used

asking Ss to describe their strategies (Adi, et al., 1978; Beyth-Marom, 1982)

ratings of cell usage Levin, Wasserman & Kao (1993)

Expectation based

Hamilton & Rose (1980)

Spears, Eiser & van der Pligt (1987)

Levin, Wasserman & Kao (1993)

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kbaltz@bgnet.bgsu.edu

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