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Contents:

Goodness Seeking Heuristic: A Special Kind of Other-Mediated Religion-Specific Decision Making

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Goodness seeking involves a special kind of religion-specific decision making in which a Muslim refers to the Quran (Allah's Book) and asks it to decide on his or her behalf. The person agrees to whatever the Quran or indeed Allah considers appropriate. The procedure is usually performed by a clergyman who randomly opens a page of the Quran and reads and interprets the first sentence or the whole content of that page and gives the result which is either good or bad. "Good" means that the person can act on and pursue the decision option he or she has in mind and "bad" means that he or she must not. The goodness seeking interpretation is greatly affected by the clergyman's judgment. However, it should be mentioned that most of the time only critical (not trivial) decision tasks require a goodness seeking practice. One important characteristic of such a decision making method is that the goodness seeker experiences less regret and negative counterfactual thinking after decisions with non-optimal outcomes; because he or she believes that Allah is the real decision maker.

Accordingly, some studies were conducted to investigate some aspects of goodness seeking decision making across the Iranian Muslim population. One thousand participants were asked if they would consider and practice goodness seeking for their critical decisions. On average, nearly 65% indicated that they would. They were also required to estimate if other Muslims would conduct such a practice. They estimated that 68% would do. In a second study, half of the participants were required to make a decision using goodness seeking and the other half made decisions by themselves. The outcomes were planned to be negative in all cases: all participants would feel emotional regret after choosing their options. Results indicated that participants using goodness seeking experienced less regret than those in the other condition of the study. They reasoned that the decisions were not theirs but Allah's and they must always accept and obey whatever He determines.

Clearly, because goodness seekers do not see themselves as the real agents in the task of decision making and implicitly or explicitly transfer all the relevant responsibilities to Allah or God, the burden of regret would be considerably lower for them. Many implications could be inferred from the findings.

Collaboration Evaluation Framework

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I have been working with Gary L. Klein of the MITRE Corporation this past year on the development of a collaboration evaluation framework (CEF). Although we are not looking solely at judgment problems, the framework is Brunswikian in orientation for it tries to describe the collaborators' task ecology. The framework describes the nature of the task, how dynamic and heterogeneous the broader task environment is, the type of interdependence among the collaborators, the type of coordination they are using, and the level and effectiveness of task support for a range of collaborative behaviors and task transmissions. With others at MITRE, we've used the CEF to help assess the suitability of three collaboration tools being evaluated for intelligence analysis, and an early prototype "collaboration support environment" that is being evaluated for military command and control. Although papers describing the specific applications are not available for distribution, I'd be glad to send a copy of a conference paper describing the CEF to all interested Brunswikians.

Demonstration of cue recruitment in visual appearance by means of Pavlovian conditioning.

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Brunswik developed the lens model, and the distinction between cue validity and utilization, to explain visual appearance. He claimed explicitly that if a new visual signal were given high ecological validity in a controlled experiment (or to be more precise, if the new signal were put into correlation with other trusted cues, as would normally occur for a signal with high ecological validity), then the new signal would come to be utilized

for constructing visual percepts, through classical (Pavlovian) conditioning. This result is important because it is the simplest form of associative learning and Brunswik's theory makes a strong prediction that it should occur. Yet empirical evidence for cue recruitment in visual perception is very limited, and ever since a seminal paper by Gibson and Gibson in 1955, perceptual learning has been described as a process of differentiation, rather than a change in utilization.

Using bistable stimuli, my students (especially Qi Haijiang) and I have confirmed cue recruitment in visual perception. The effect is highly reliable and consistent across individuals. It was probably missed when people looked for it in the 1950's because (a) the rate of learning can be low, (b) it is nontrivial to demonstrate a true change in appearance (as opposed to response bias or cognitive strategy), and (c) sensory adaptation aftereffects are in the direction opposite the conditioned learning.

Our work will now be directed towards exploiting this finding. Cue recruitment experiments make it possible to study a variety of classical conditioning phenomena in perception: extinction, blocking, second order conditioning, learned irrelevance, etc. We do not in all cases expect perception to follow patterns from the animal learning literature. For example, blocking would be a peculiar outcome in perception, if one takes probabilistic functionalism seriously. Learning one new cue should not prevent the system from learning a second new cue later on, that is presented simultaneously with the first, because in the real world cues come and go. It would behoove the system to learn the second new cue while it can.

A bit of theory: Brunswik argued in favor of representative design for experiments. Curiously, his theory suggests doing the opposite, when the goal is to establish the first examples of cue recruitment. The reason is as follows. Any simple signal will have been measured multiple times in the organism's previous history, when it will have been uncorrelated with the trusted cues (that it is now being paired with in the experiment). So the system comes into the experiment believing, with high confidence, that the new signal should *not* be used to construct the perceptual attribute for which the other cues are relied upon. On the other hand, the system surely knows that ecological validities change from one environment to another. Thus, the learning rate for a new cue is expected to be higher in a new, unusual environment than in old familiar ones.

Cognitive Systems Engineering Educational Software (CSEES) prototype is now available.

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At the University of Virginia (UVa), my student Matthew Bolton and I have developed a prototype system called the "Cognitive Systems Engineering Educational Software (CSEES)" system. CSEES supports the generation and analysis of human performance data on judgment tasks. The idea is that a student can learn about a judgment performance analysis method, collect performance data using a judgment task environment, and then use CSEES to analyze those data. With CSEES, the student will be able to model data using more than one technique in order to gain insight into the commonalities and differences between them.

The current CSEES software package is a Microsoft Excel add-on designed to provide access to judgment task environments and analysis methods via a graphical user interface. Task environments allow performance data to be collected or generated and made available for analysis. In some cases, instructors may want to take advantage of applications already integrated into CSEES. In other cases, instructors may have other applications for the collection of performance data. CSEES facilitates this in two ways. Firstly, each task environment is run as a separate process activated dynamically through the graphical user interface. A new process can be added to the list of available task environments by placing an executable or shortcut in a folder in the CSEES installation directory. Secondly, data generated or collected by a task environment can be imported to CSEES via Excel's data importer.

In addition to descriptive statistics, the initial set of analysis methods supported by CSEES are signal detection theory (SDT), fuzzy SDT, and double system lens models including the skill score. The CSEES graphical user interface guides the student through the generation and analysis of data. Excel itself serves as an important part of the CSEES. It gives students a familiar spreadsheet like interface which allows them to enter and manipulate data. Secondly, it contains a flexible data importer which can be used to import data from the task environments. Finally, it allows for dynamic function based computation which permits students to inspect the CSEES generated

computations in order to see how they were performed and to dynamically change parameters in the spreadsheet in order to see how they affect the results. In addition to the spreadsheet interface, each analysis method has an associated dialog box which can be accessed through the analysis menu and the calculator button on the toolbar. These dialog boxes are used to collect user input. When activated, CSEES scans the active Excel worksheet in order to identify column based series of data (variables). Students then use the dialog box to identify which variables they want to use in the computation and enter any other relevant input. When the analysis is run, a new Excel worksheet is generated with the desired results as well as all the intermediate steps used to compute them.

A website (http://cog.sys.virginia.edu/CSEES/) is in the process of being developed in order to provide free access to the software. As such, we encourage professors and students to send any contributions and recommendations relating to any of these topics to the authors. We are convinced that with strong community involvement, this educational software can be a success.

Decision-by-Sampling. A new theory of decision making, with no 'psycho-economic' scales

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Theories of decision making frequently assume that people represent key numerical quantities concerning, e.g., utilities, probabilities, or intervals of time, using some kind of subjective scale, which can then be used as the basis for some kind of numerical evaluation of the available options. Decision by sampling (DbS), developed by a Neil Stewart, Nick Chater and Gordon Brown, takes the very different starting point that people do not represent cardinal scales for these or any other dimensions, but that they instead can make only binary comparisons between items on any dimension. This rather extreme viewpoint emerges from one interpretation of psycho-physical results, indicating that simple binary comparisons can explain a great deal of data on human magnitude estimation (Stewart, Brown & Chater, in press).

According to DbS, the subjective value of, say, a sum of 10 dollars, is constructed on the fly by comparing it with a small sample of other amounts of money, draw either from the immediate context, or from memory. Diminishing marginal utility is explained on the assumption that samples from memory are j-shaped (assuming that they follow the distributions of actual sums of money). This means that it is likely that sample may produce items that differentiate between 10 and 50 dollars, but unlikely that there will be any sampled item in between 1,000,000 and 1,000,050 dollars. Hence the latter two will be treated as having the same subjective value. The inverse-U shape in probability judgement is explained by the fact that probabilities (e.g., in google --- and presumably in memory) are strongly biased to be near 0 and 1, hence increasing sensitivity near these oversampled values. An experimental prediction is that, by changing the other items in context (which are hence likely to be sampled), preferred trade-offs between items can be dramatically modified (e.g., Stewart, Chater, Stott & Reimers, 2003). An interesting question for future work is whether mere binary comparisons between items are really sufficient to explain people's values and preferences; and how the theory may relate to decision-making in experiential, rather than descriptive, conditions.

Stewart, N., Brown, G. D. A., & Chater, N. (in press). Absolute identification by relative judgment. Psychological Review.

Stewart, N., Chater, N. & Brown, G. D. A. (in press). Decision by sampling. Cognitive Psychology.

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Reflections from a Judgment and Decision Making Perspective

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The following is an abstract from a chapter to appear in A. Kirlik (Ed.), *Adaptive Perspectives on Human-*

Technology Interaction. New York: Oxford University Press, 2005

Among the more irreverent Northwestern graduate students of my day there was active debate as to whether Egon Brunswik's reputation as a deep thinker had been achieved in spite of, or because of, the opacity of his prose. It was only the firm hand of Donald T. Campbell (once, I believe, Brunswik's teaching assistant at Berkeley, but at that time the guru of the Northwestern psychology department) that drove us through the thickets of dense German and imperfect translation. A first reaction to the present volume is to conclude that Brunswik's reputation is secure. Here is a body of first-class work inspired by, informed by or otherwise tied to central Brunswikian ideas of half a century or more ago. The prose, it turns out, was worth the struggle. If only we had had Goldstein's lucid introductory essay (Chapter 2, this volume) to guide our earlier studies!

The second reaction, at least to this JDM researcher, is a certain envy. Most of our studies, defying Brunswikian rules, rely on super-simple, artificial tasks – one-sentence scenarios, transparent gambling games, unfamiliar hypotheticals. Not uncommonly our data matrix is an N x 1, a single response from N different subjects. If nothing else such data leave a considerable burden on the investigator to explain just why anyone should care what these subjects did in this task. It is not an impossible task to explain that this is, we think, the way (a way?) to theory, but it is a burden nonetheless. One assumes that the authors of the papers collected in this volume rarely face such a demand for explanation. When one addresses tasks such as aircraft collision avoidance, battlefield threat assessment, chemical-plant fault diagnosis or identification of radar images as friendly or hostile aircraft, it seems self-evident that understanding and improving the judgment and decision processes involved will be matters that the relevant practitioners care about.

It is self-evident that JDM researchers would also like to have something useful to say in the world of significant decisions – to medical doctors forming diagnoses, to investors planning a retirement strategy, to faculty selecting graduate students. Here, I think, JDM researchers have set themselves a more difficult task than have the Human-Technology Interface (HTI) researchers represented in this volume. At least the latter start with one domain of application, the one in which the original research was conducted. The JDM researcher, in contrast, having started with a highly simplified, thin task must undertake a tricky extrapolation before reaching even the first domain of potentially useful application.

The work of extrapolation is not always done well. The simplest, and nearly always the most misleading, approach is simply to assert that the extrapolation works. "We have discovered in our lab that human beings display the following capability/bias/error. You should therefore be ready to deal with this capability/bias/error in your application problem". The simplistic assertion of universalism across subjects, tasks, settings and times is too obviously dubious to be made explicitly, but can be accomplished less obtrusively. Often a simple shift of verb tense does the trick. The Results section reports what *these* subjects *did*, (specific past tense); the Discussion section moves to what humans *do* (continuing nonspecific present tense), a claim on which the author has essentially no evidence. What a good empirical study establishes is an existence theorem: there exists at least one population, task, setting and time for which some effect has been observed. Replication with other subjects, etc. is a matter for demonstration, not assertion. Very often, the demonstrations fail.

So what *does* JDM research bring to the cognitive engineering, HTI table? For more on Connolly's reflections get hold of the chapter and the book.

Inter-disciplinary Observations

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Since the last Brunswik Newsletter, I have moved to work at the Institute of Criminology, University of Cambridge, UK. I have been trying to explain Brunswikian psychology to students and colleagues trained in the disciplines of law and sociology. On the one hand, they understand and recognize the need for representatively designed research, more than most Psychologists. However, on the other hand, they find it difficult to understand and work with the concept of a probabilistic environment. Brunswikian psychology departs from law and sociology in other ways too. For instance, while the former focuses on what "is" in relatively objective terms, the law focuses on what "ought" to be, and sociology embraces subjectivist

accounts. Perhaps the observation that most interests me is that both sociology and law work with their own theories of human psychology, which are unfortunately sometimes incompatible with psychological theories and research. I am currently working on a review of the socio-legal research on sentencing decisions. In addition to pointing out the methodological and analytical shortcomings of this body of research, I want to highlight that J/DM research can actually learn something from it. For example, we could usefully conduct more studies of multi-level human J/DM.

How sampling affects perception of means and correlations

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Richard Anderson and I, along with a few students, have been investigating the perception of correlation, with special reference to the small sample advantage first advanced by Yaakov Kareev and his colleagues. A paper with the simulation data we presented at last year's meeting was published in the January Psychological Review, along with a paper by Peter Juslin and a commentary by Kareev. Our work was framed in terms of the necessity of understanding the environment before trying to understand the person in that environment. Last year, we noted that high sampling variability was associated with small sample sizes, as well as the skew implicated by Kareev. If the inverse relation between sampling variability and sample size underlies the quite limited small sample advantage in correlation detection that we found in our simulations, then it ought to occur with the detection of means. It does. A set of simulations showing a small sample advantage for mean detection is in press in Memory & Cognition, and a preprint will be available at the Toronto meeting if anyone is interested.

We also have some behavioral data on the effects of sample size on the perception of population correlation. Our simulations predicted a small sample advantage if and only if a subject adopted a conservative criterion. We found an advantage for a liberal criterion. For what seemed like good reasons at the time, we had not simulated what would happen with a very liberal criterion. A new set of simulations made it clear that there should be a small sample advantage with an extreme criterion, either liberal or conservative. A new behavioral investigation will be under way soon, with the new simulations in mind, as is another new study which employs a very different response mode.

A set of studies involving the perception of correlation from scatterplots has been completed, and will be presented at the Psychonomic Society meeting. We found a radically different function form than the positively accelerated function found in all but one previous study relating subjective correlation to objective correlation. We believe that our investigation is much more representative of the way that people actually draw inferences from scatterplots, that is, one at a time rather than in the context of a number of other scatterplots.

Studies in Political Psychology

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For the last several years I have dabbled in a number of different lines of research, although all have been rooted in Brunswikian theory. Over the past two years, my research program has narrowed to almost exclusively focus on issues of political psychology. I have a number of projects ongoing in this area.

First, the paper Ken Hammond and I presented last year using Brunswik's Lens Model and the Taylor-Russell diagram to frame the policy of preemption has been accepted for publication in Peace and Conflict (Dunwoody & Hammond, 2006). A preprint of this paper is available on my website (address in reference section below). I am currently working on a second paper based on the presentation I made during the discussion panel last year on how to "fix" the broken intelligence community.

The second project, which is directly related to the first, involves collecting data to understand the basis for judgments in support or opposition to the policy of preemption. This work utilizes a variety of measures to predict people's support for the policy of preemption. Estimates of the likelihood of false positives, false negatives, and the consequences of each error are combined using an expected utility framework and directly relate to one's support for preemption. A number of individual difference variables were also evaluated for their relationship to supporting

preemption. Of the individual difference variables explored, Right Wing Authoritarianism and American Social Identity contribute most to support for preemption. Regressing a ratio of the expected utilities of false positives to false negatives, Right Wing Authoritarianism and American Social Identity onto support for preemption yielded an adjusted R squared of 0.61. I will be presenting portions of this work at this year's Brunswik conference (Dunwoody, Plane, Drews, Rice & Rinehart, 2005).

The third project I am involved in examines pedagogy and politics and is being done in collaboration with Donald Braxton. There have been claims that liberal faculty members are intellectually abusing their more conservative students. Anecdotal evidence of conservative students who feel they have been unjustly treated by liberal faculty serves as the data for this claim. However, there is a lack of systematic evidence about the actual frequency of such events and the psychological mechanisms that may be at work when there is a perceived personal attack. We hope to answer some of these questions.

Dunwoody, P. T., & Hammond, K. R. (2006). The policy of preemption and its consequences: Iraq and beyond. Peace and Conflict: The Journal of Peace Psychology. Preprint available at: http://faculty.juniata.edu/dunwoody/

Dunwoody, P. T., Plane, D. L., Drews, D. R., Rice, D. W., & Rinehart, A. J. (2005). Judgments of potential threat to U.S. citizens or interests. Paper presented at the Twenty-first Annual International Meeting of The Brunswik Society, Toronto, ON, CA.

When Individual Learning is not Enough: The role of social Learning in Group Decision-Making

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Though learning is a core adaptive psychological process, its limitations in acquiring adaptive responses has also long been discussed (cf. Einhorn, 1980). One limitation is illustrated in a simulation study carried out by Dieckmann and Todd (2004). More specifically, these authors investigated the accuracy of a wide range of simple individual learning rules for ordering cues in inference tasks. These authors found that none of the rules they tested could acquire a cue ordering that performs at the level of the Take The Best (TTB; Gigerenzer & Goldstein, 1996, 1999) heuristic. TTB is a precise step-by-step algorithm that searches through cues in the order of their validity, it stops search once a discriminating cue is found, and it decides in favor of the alternative to which this cue points.

In the current study, we hypothesize that the limitation of individual learning could be overcome by social information pooling (see also Hastie & Kameda, 2005). In the real world, it seems to be the case that people often exchange information that they individually experienced, and socially pool the information that each individual acquires. Social learning may be able to improve the performance of simple rules for ordering cues by aggregating information that each individual accumulated independently. In order to confirm this hypothesis, we conducted a computer simulation. Interestingly, results showed that the level of accuracy in decision making that the validity cue-ordering rule based on social learning achieves, is similar to that of TTB. Results in further simulations showed two interesting findings. In order to achieve the level of performance of TTB, it is not necessary to exchange information with a large group of people: Information exchange in a group of five (or even two) people is enough. Intensive social exchange is not necessary, either. More specifically, information exchange with the members of a group, by every five trials, leads to a good performance.

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Gigerenzer, G., & Goldstein, D. G. (1999). Betting on one good reason: The Take The Best heuristic. In G. Gigerenzer, P. M. Todd, & the ABC Research Group, *Simple heuristics that make us smart (pp. 75–95).* New York: Oxford University Press.

Hastie, R., & Kameda, T. (2005). The robust beauty of majority rules in group decisions. *Psychological Review,* 112, 494-508.

Sampling and analyzing non-verbal communication

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After a hiatus of several years in the land of environmental psychology, I (and my students) are in the midst of completing a study on the role of nonverbal behavior as it encodes romantic rapport and as romantic rapport is decoded from nonverbal behavior. 50 mature community couples who vary in their current level of rapport volunteered to converse on such topics as the trip they would like to take for our video cameras. Selected nonverbal behaviors are being examined as encoders of their rapport, and unacquainted peers (other community adults) will decode rapport from the videotapes. I am just re-starting this study after half was done some time ago, so I have nothing much to report in terms of results yet.

But oh yes, there's also this chapter I am just completing... I am just today finishing a chapter for the *Handbook of Nonverbal Communication*, edited by Miles Patterson and Valerie Manusov (Sage), on personality and nonverbal behavior. The interest for readers of this newsletter is that I suggest that the key to understanding the relations between personality and nonverbal behavior is to use a lens model paradigm, and a good part of the chapter is devoted to explicating an exemplar study that uses the lens model to further understanding in this area of research.

Egon Brunswik and Twentieth-Century Psychology: A Reassessment

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The following are two abstracts from recent presentations.

2005 marks the half-century since the untimely death of Egon Brunswik in 1955. In this paper I examine Brunswik's place in twentieth-century psychology. My aims are to outline some of his principal achievements and to examine the current relevance of some of his ideas. To achieve these aims I first point out that a central (and much neglected) feature of Brunswik's probabilistic functionalism is his organism-environment model. In assessing this aspect of Brunswik's work I relate his ideas to those of other twentieth century theorists also interested in organism-environmental relations - especially those of James Gibson. A second focus of the paper is Brunswik's idiographic-statistical approach. This will be outlined and its implications considered for current debates about the idiographic-nomothetic distinction. Brunswik's much misunderstand notion of ecological validity is the focus of the third part of my paper in which I briefly illustrate some of the recent misconceptions about this important notion. In my concluding assessment, in addition to considering the relevance of Brunswikian ideas for twenty-first century psychology, I address some of the reasons for the unfavourable reception of his ideas during his lifetime and I end by noting the problematic nature of assessing influence in the history of ideas.

In his chapter in the Routledge *Companion to the History of Modern Science*, Larry Laudan expresses the following concern: If historians continue to refuse the challenge of giving a general account of scientific change…then others (especially philosophers and sociologists), possibly less suited to the task (he might well have added psychologists), will step into the breach (Laudan , 1990, p. 57). While this concern might suggest the need for closer cooperation between historians and philosophers of science, a later paper by Hans Radder has questioned whether in post-Kuhnian philosophy of science the links between the history and philosophy of science are still productive (Rader, 1997). In this paper I consider the links between the history and philosophy of psychology through a case study of disciplinary change in twentieth century psychology. I shall examine the work (and its reception) of three marginal figures in twentieth century psychology - James Gibson, William Stephenson and Egon Brunswik. Born within two years of one another, each was still actively developing his ideas at the time of his death (Brunswik, 1955; Gibson, 1979; Stephenson, 1989). Their marginality issued from different sources and was manifest in different ways. The ideas of all three were sufficiently radical to be seen as revolutionary had they been adopted successfully. I shall draw upon some details of the diverse trajectories of their careers to explore the

relevance of some contemporary theories of scientific change to an understanding of the dynamics of intellectual change in twentieth century psychology.

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The possibility of multiple judgment strategies

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At the Brunswik meeting in Toronto I will talk about a topic I have explored in a chapter in a forthcoming book, edited by Henning Plessner, Cornelia Betsch, and Tilman Betsch, to be called "A new look on intuition in judgment and decision making." The book based on the talks from a conference in Heidelberg in February of 2004. At the conference, many of the participants talked about intuition as hot, cerebellar, contextual, and based on different brain functions than cool, cerbral, decontexualized analysis. I was one of the few for whom intuition meant fast, automatic, out of awareness, but otherwise involving judgments and being the sort of thing that an expert does (based on extensive learning) rather than the sort of thing a monkey does.

If we apply the typical Brunswik Lens Model research method (multiple regression) to a set of judgments, we implicitly assume that the judge is doing the same sort of thing every time, with a bit of noise and inconsistency. What if the judge were in fact doing two different things? Or three? (Each with a bit of noise and inconsistency.) What if in the participant's room, in which we had locked him until he finished all 64 of his judgments, he had actually snuck his girlfriend and they were taking turns responding, each using his or her own policy? What if the judge had a program on her palm pilot that she used sometimes, but on other cases she just used her own judgment? How could we differentiate the cases on which the two distinct judgment policies were used? How could we determine if indeed there are two or more distinct judgment policies, or just one plus noise?

The approach I take is hypothesis testing: If we have a basis for guessing which responses use which strategy, it can test if there is a difference in cue use between the sets that we have tentatively attributed to each strategy. It makes interaction terms between a variable reflecting our guess of which set each judgment belongs to, and the cue variables. Simulation shows that those interaction terms are statistically significant when the cue was used differently in the one cue than the other.

In my talk, I will invite discussion of whether this is an important issue, whether it merits more extensive simulation, whether it can be tested with existing judgment data sets, and whether it is worth collecting new data on.

Beyond Rationality: The search for wisdom in the 21st century

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During the past year I managed to complete my mansucript entitled "Beyond Rationality: The search for wisdom in the 21st century". Officially speaking, this

will be a "trade book", rather than an academic book, but it will still be highbrow enough to interest members of the Society.

The manuscript is now at the publisher being edited for a trade market. It was hard to finish this manuscript because the news brought new material for examples of application every day. Of course, I hope that the manuscript will be approved by my colleagues in the Brunswik Society. I anticipate publication in late 2006 or early 2007.

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Brunswikian research at the University of Connecticut

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Research in the Brunswikian tradition continues at the University of Connecticut.

At the University of Connecticut we are involved in research on individual differences in judgment. For her master's thesis, Amy Reese investigated effects of MCPL task characteristics on model of cognition, and how individual differences relate to performance. Specifically, we were interested in participants' preferred thinking style (measured by the REI and DMSI). Study participants engaged in three MCPL tasks designed to induce intuition, analysis or quasi-rationality. There were significant differences in cognition between the analytic and other two tasks. Furthermore, there were quadratic trends for performance in the quasi-rational and analytic tasks, corroborating the notion that no one mode of cognition is superior to another in every task. It was found that preferred thinking style matters in the first block of trials, but task characteristics seem to take over as primary influences.

For her dissertation, Liz Pratt extended Cooper's (1976) analytic and holistic cognitive styles beyond the visual discrimination paradigm and into a multi-attribute decision-making context of varying automation levels. Two experiments examined the impact of cognitive style (analytic, holistic, or quasi-rational), short-term memory (STM) capacity, and training on computer interface usability of a pilot simulation task. Performance data (reaction time and accuracy), perceived workload (NASA TLX), and situation awareness (SAGAT) perceptions were collected. Individual differences in cognitive style and STM capacity interacted with training content to influence transfer performance, situation awareness, and perceived workload. Training with adaptive automation was the best training method for all participants. Participants with a quasi-rational style performed better than analytic and holistic participants because they were able to adapt their visual search strategy more easily to a novel task.

Diagnostic Decision Making: Environment, Experience and Errors.

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General Practice is usually the first point of contact of patients with the healthcare services in the UK. It is characterised by a vast range of possible diagnoses, early and often undifferentiated disease presentations, low base rates of serious illness but high base rates of other illnesses, and restricted access to reliable diagnostic tools. Time for the doctor-patient encounter is limited (5-10 minutes), access to specialist advice is not prompt, and outcome feedback is often unavailable. The diagnostic skill of the General Practitioner (GP) lies largely in identifying serious from less serious disease and managing it timely and appropriately.

Doctors who decide to specialise in General Practice come to it from a hospital environment. This is characterised by a narrow range of differential diagnoses with a relatively flat frequency distribution; pre-selected patients (referred by a General Practitioner with a possible diagnosis), serious disease, relatively typical disease presentations, plenty of time for consultation, comparatively good amounts of outcome feedback, and others to consult in a team. Investigations are easily available and often done as a matter of routine.

Certain errors might be predicted given the difference between these 2 task environments. In our 22 month project we are attempting to predict the type of errors that will occur on different types of diagnostic cases given different levels of GP experience. We expect to find the most pronounced differences between new GP registrars (fresh from hospital training) and GPs with at least 10 years of experience (the traditional cut-off point for calling someone 'an expert') but we will also be looking at an intermediate level of experience.

Comments and suggestions are welcome!

Confidence Calibration and Performance Differences in General Knowledge Tasks

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This year I explored some problems related to the overconfidence effect. The initial brunswikian conjecture was that distortions on calibration, when they emerge, are controlled by a complex function where performance differences and task variability have weight. The experimental task designed to test the performance differences hypotheses required answers to general knowledge questions followed by a statement about the subjective calibration of success. The questions were randomly chosen from a list of hard to answer pre-tested questions on topics such as geography, history, arts, and science. In the preliminary phase of the study, 79 subjects answered 30 general knowledge questions and gave a general confidence calibration statement. The distribution of both variables, i.e. performance and confidence, was normal. The distribution of the difference between both was also normal. The difference between performance and confidence, slightly in favor of confidence, was not significant for the 79 subjects. Two groups were then defined, one had a performance above the mean, and the other had a performance below the mean. The group in the upper tail of the performance distribution showed systematic under-confident statements. The group in the lower tail of the performance distribution had systematic over-confident statements. In both cases the differences were statistically significant. These results suggest that differences in performance are crucial for the configuration of over- or under-confident effects, and that good performers with actual success above the mean are prone to under-estimate their performance, while bad performers with actual success below the mean are prone to over-estimate their performance in hard to answer general knowledge tasks.

In the present phase of the study I am exploring some classic debiasing experiments that try to put some critical environmental variables together in an ecological model to explain the complex phenomena of confidence subjective calibration.

Is Ignorance Useful and Used? Applying the Recognition Heuristic to Political Elections

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Is it possible to forecast election outcomes from citizens' ignorance alone? Do potential voters rely on their ignorance to forecast election outcomes? We tried to answer these and related questions by applying the recognition heuristic (Goldstein & Gigerenzer, 1999, 2002) to a new real world environment, namely the 2004 parliamentary elections of the German federal state of Brandenburg.

The recognition heuristic (Goldstein & Gigerenzer, 1999, 2002) is a simple decision-making strategy for inferring which of two objects, one recognized and the other not, has a larger value on some quantitative criterion. If there is a positive correlation between the recognition of objects and their criterion values, that is, if people's ignorance of objects is systematically rather than randomly distributed, the heuristic predicts that recognized objects are larger. The correlation between recognition and the criterion is presumed to arise through mediators in the environment. These make it more likely to encounter, and thus recognize objects with large criterion values.

The five main analyses of our study served the following purposes: (a) to investigate whether it would be possible to derive accurate election forecasts by using citizens' collective pre-election recognition of the names of candidates and political parties, (b) to explore whether the media and local distributions of election advertisements could represent mediators that would give rise to associations between citizens' pre-election recognition of the names of candidates and political parties on the one hand and election outcomes on the other hand, (c) to examine the predictive accuracy individual citizens could attain by relying on the recognition heuristic when forecasting the election outcomes, (d) to describe the ability of the recognition heuristic to account for citizens' election forecasts, and (e) to examine instances where citizens decide against the recognition heuristic (i.e., predict unrecognized candidates or parties to gain more votes than recognized ones).

Using a questionnaire we collected data on citizens' pre-election recognition of names of candidates and political parties. Furthermore, citizens were asked to predict the election outcome in paired comparisons and ranking tasks. For analyses of the mediating structures of the pre-election environment, the number of times that candidate and party names appeared in newspapers and on election posters before the election was counted.

(a) Participants' collective recognition of party and candidate names yielded accurate election forecasts. (b) We found substantial correlations between participants' pre-election name recognition, pre-election environmental frequencies of names, and the election outcomes. (c) For most participants, following the recognition heuristic resulted in accurate election forecasts. (d) The recognition heuristic was descriptive of a large majority of citizens' election forecasts. (e) To examine the instances where citizens decided against the recognition heuristic we came up with a re-conceptualization of some of the main variables of the recognition heuristic. The results of analyses taking into account these variables suggest that some people used additional knowledge when their predictions did not follow the recognition heuristic. More knowledgeable participants were here on average more successful in deriving accurate election forecasts in discordance with the recognition heuristic than less knowledgeable ones. Surprisingly, for both groups of participants, not always adhering to the recognition heuristic did on average not pay off in terms of gains in predictive accuracy in their election forecasts, and less knowledgeable people would have derived considerably more accurate election forecasts if their forecasts had simply always followed the recognition heuristic.

In sum, there may not only be a cost-effective way to derive quick-and-dirty election forecasts based on citizens' name recognition, but also in certain situations citizens themselves may be able to ground their voting decisions on ignorance-based ad hoc prognoses of election outcomes. The findings additionally suggest

that some people have and use knowledge on when not to rely on the recognition heuristic. In sum, ignorance is useful and may be used.

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Is performance on a dynamic control task enhanced when it is based on one's own or another's prior experiences?

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When Brunswik presented his model of intuitive cognition – his lens model, in essence what was demonstrated was that perception of the physical world was understood from information that is noisy, and therefore fallible. The pursuit of what information that can be "seen" is available to make inferences about the "unseen" has been a fruitful source of empirical research in the decision making domain. What has been often demonstrated is that, despite noisy environments, people are remarkably good at integrating information in order to form accurate judgments about that environment, and some (e.g., Hammond, 1996) have argued that this typically occurs on the basis of intuitive (implicit) processes. That is, people often lack self insight into the processes that contribute to their decision making, in addition, people's lack of awareness of the information that they utilise is dissociated from their ability to accurately predict and understand the environment.

Given these issues the present investigates the following questions: When presented with the products of their decision making, can people recognise them as their own? In addition, does this help them understand a dynamic control task better than when presented with examples of another individual's decision making? The idea behind addressing these questions is to examine whether, in a complex problem solving task, people are in full possession of their decision making process whilst exploring and learning about a dynamic system, which later they have to control. If people do not have full access to the strategies that they develop to integrate information, then one would expect that when presented with a replay of their learning phase, they would be unable to detect that it is their own. However, one would still expect that they would benefit from being presented with their own learning experiences again, and that this would improve their performance on the problem solving task when completed for a second time.

The present study included three experiments in which participants solved two identical dynamic control problem solving task that only differed according to their cover story; these were based on Burns and Vollmeyer's (2002) original water tank system problem. Each problem solving task was split in two phases: the exploration phase in which participants were given the opportunity to explore the system, and the test phase in which they were required to demonstrate their knowledge of the system by controlling it. In each experiment there were two conditions: In condition 1 participants were presented with the exploration phase from the first problem again in the second problem. In condition 2 in the second problem participants were presented with the exploration phase of participants from condition 1. Across all three experiments (n=72) the results consistently showed participants were able to accurately detect their own from another's prior learning experiences. Second, the results revealed that in condition 1 performance was impaired in the second problem when compared to the first, whereas in condition 2 performance in both problems was the same.

The fact that people do worse when they learn to perform a problem solving task on the basis of their own prior learning experiences is inconsistent with much evidence from self observation studies (e.g., Louda et al., 2005) in the motor learning field. Evidence from this field shows that people improve their performance on numerous tasks after having observed their own earlier behaviour. As yet, I have been unable to provide a rationale for this inconsistency, and in particular, why it is that one's own prior experiences would be detrimental to learning.

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Influences on occupational therapists' decisions in the management of upper limb hypertonicity of children and adolescents with cerebral palsy

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It has been postulated that occupational therapists use both theoretical and practical knowledge (factors), based upon identifying client's goals in the process of making decisions about clinical intervention methods (Chapparo, 1997). The overall aim of this study was to identify these factors and their relative contributions to the decisions therapists make in the management of children and adolescents with cerebral palsy (CP) and upper limb (UL) hypertonicity. There is a paucity of research evidence about what factors therapists attend to when making decisions about the management of UL hypertonicity for clients with CP. To identify and evaluate these factors, the current research employed Social Judgment Theory (SJT) (Cooksey, 1996). This methodology was selected because it had the capacity to access intuitive thought or tacit knowledge (Hammond, 1996) which it has been shown therapists have difficulty explaining (Mattingly & Fleming, 1994; Unsworth, 2001).

The current study proceeded in three main phases. Phase One was conducted to identify the most relevant factors to be used in the case vignettes necessary for the application of SJT. This process included a review of the literature, consultation with clinical experts and then involved twelve experienced therapists in a process of identifying, refining, and ranking the relevant factors in order of priority. As a result 12 factors were identified. Then in Phase Two appropriate scales were identified for their measuring and 10 sample case vignettes as well as an administration manual were developed and piloted. Finally, 110 case vignettes were generated randomly (20 were repeated to examine consistency) for the third phase of the study.

In Phase Three, 18 experienced occupational therapists made decisions about intervention options for the generated case vignettes. Findings revealed that therapists mainly used three factors to guide their decision making: severity of spasticity, wrist and finger posture, and client and family background. They had poor insight into their decisions and demonstrated only moderate consistency. Therapy setting was independent from therapists' objective and stated policies but it influenced their intervention options. Therapists' length of experience influenced their intervention options and stated policy but not their subjective policy.

In summary, this study demonstrated that SJT could successfully be used to investigate factors influencing therapists' decision making in the management of clients with UL hypertonicity with CP. This study further demonstrated that individual and group factor weightings, the level of therapists' self-insight into their decisions, as well as their specific work settings and length of experience could impact on their decision making.

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Can Regression Analysis Detect Synergisms in Negatively Correlated Environments?

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Experienced decision makers frequently employ synergistic strategies when making judgments (Shanteau, 1992). A synergism is an action "such that the total effect is greater (or less) than the sum of effects taken independently" (Webster's New Collegiate Dictionary, 1979).

In judgment research, synergisms often appear as a multiplicative (cross-product) interaction: R = f (A x B). Some examples of synergisms include:

Performance = Motivation x Ability

Aspiration Level = Desirability x Expectancy

Learning = Habit Strength x Drive

The best-known example in judgment/decision research (JDM) is:

Subjectively Expected Utility

= Subjective Probability x Utility.

This familiar SEU model has become the bedrock of research on risky decision making (Edwards, 1954).

In orthogonal (ie, factorial) designs, detection of synergistic models is straightforward. Specifically, there should be an interaction concentrated in the bilinear component of an interaction (Keppel, 1991). This can be detected either graphically or by statistical analyses.

However, factorial designs have limited ability to reflect important environmental relationships (Brunswik, 1954). As a consequence, non-orthogonal designs are preferred for social judgment research. Using analyses based on multiple regression statistics, the Lens Model has provided important insights into a variety of judgment problems (Hammond & Stewart, 2001).

The question raised in the present research is two-fold: First, can regression-based analyses detect synergisms? Second, how do negatively-correlated environments influence detection of synergisms?

NEGATIVE CORRELATIONS: Many, perhaps most, decision situations involve tradeoffs. That is, it is necessary to tradeoff high values on one cue against lower values on another cue. Thus, it is not possible to find options with maximum values on all cues; if it was, the judgment task would be trivial.

As McClelland (1978) argued, the necessity of making tradeoffs leads to negatively cue values, even when cues in the original set of options are uncorrelated or positively correlated. Given an initial options space, dominance reduces the effective choice set to those on the Pareto Frontier, which has a negative slope. Thus, the non-dominated options contain tradeoffs that are negatively correlated.

This means that negatively-correlated environments are the rule, not the exception in JDM tasks. As such, it is imperative to understand how such environments impact the ability to detect synergistic behavior (Johnson, Meyer, & Ghose, 1989).

METHODS: Three phases of research (design-observe-evaluate) were simulated in three stages (environment-behavior-analysis) using Monte-Carlo computer techniques. To begin, 2-cue environments were generated using the program CUEGEN to have correlations ranging from +.90 to –.90, with 7 intermediate values. The number of cases in each stimulus set was either 25 or 100; only the results for 100 cases are reported here. Nine independent stimulus sets were created for each combination of correlation values and case size. Thus, 9 (correlation values) x 2 (stimulus set sizes) x 9 (independent sets) = 162 simulated environments were generated. (Note: It proved difficult to generate uncorrelated stimulus sets, ie, r = 0.0, that satisfied constraints placed on all sets, such as mean and variance.)

To simulate participant's behavior, first a "true model" was specified: either linear (R = A + B) or synergistic (R = A x B). Then, an error term was added to each simulated response equal to one-half the coefficient of variation, ie, error = ½ x Standard Deviation / Mean. (Note: A number of other ways to define error were explored. However, the present approach yielded the most realistic data. Moreover, the pattern of results did not depend on the particular formula for error.) Simulated responses were generated for 10 "participants" using either a linear or synergistic response rule. (Note: Other behavioral rules were also simulated using this approach (eg, R = A + B + A x B). However, the results for these "mixed" models were more variable and so are not discussed further.)

The researcher's role was simulated by applying and comparing the results from different analytic strategies. Specifically, multiple regression models were fit that either did or did not contain a cross-product (configural) term. In multiple regression, the model either took the form of a simple linear model ($X_1 + X_2$) or a multilinear model ($X_1 + X_2 + X_1 \times X_2$). Ordinary least square (OLS) techniques were used to obtain beta weights for each in each model. (Note: The zero intercept and its weight have been omitted for clarity. These values were always near zero and added little to the interpretation of results.)

Taken together, the Monte-Carlo analyses of the three phases (environment, behavioral model, and statistical analysis) led to 14,580 separate simulations. For analysis, results were averaged over the 10 "participants" for each stimulus set.

RESULTS: Before describing specific trends, it is important to note the results were reasonably smooth and lawful. There did not appear to be any anomalies or unusual features in the pattern of results. Thus, the approach to simulations used here led to orderly data.

Three results are notable: First, negative intercorrelations uniformly led to a sizable drop in the fit of all multiple regression models. For instance, the R^2 for the multilinear model is relatively flat for positively correlated cues, rising to.70 for an intercorrelations of +.90. For negatively correlated cues, on the other hand, there is a sharp "elbow" between –.25 and –.50, with R^2 values of around .20 for an intercorrelation of –.90. This drop in R^2 values from .70 to .20 highlights the difference between positively and negatively correlated environments.

Second, there is little difference for positive intercorrelations in the R^2 fit of the two regression models (linear and multilinear) for the data with and without multiplicative synergisms. However, the improvement in fit for adding a cross-product term increases dramatically with negative intercorrelations. As measured by the difference in R^2 values (= ΔR^2), positive intercorrelations lead to ΔR^2 values around .05. But this increases for negative intercorrelations, with ΔR^2 values of .25 for r = –.90.

Third, a comparison of inferential regression statistics revealed the hierarchical test proposed by Cohen and Cohen (1975) was superior in detecting synergisms over "standard tests," such as tests of beta weights. In the hierarchical test, ΔR^2 values are tested using an F-ratio; the test examines whether there is a significant gain in variance-accounted-for by a multilinear model over a linear model.

When simulated responses are generated by a synergistic model, there is an increase of F values as the intercorrelations go from positive to negative. For instance, the average F for +.90 is just over 30, whereas the average F for –.90 is nearly 110. Thus, the impact of a synergism increases dramatically as the correlation between cues becomes more negative.

DISCUSSION: There are three noteworthy findings from the present study. First, multiplicative synergisms do matter a great deal in the nonorthogonal designs typically used in judgment research. When analyzing synergistic data, there is big difference between using "correct" or "incorrect" regression models. Although the effect is more pronounced for negatively correlated cues, the impact of a synergism can be seen throughout the range of cue intercorrelations.

Second, many of the "common practices" in analysis of nonorthogonal data are called into question by the present results. For example, the most routinely used index of fit (R^2) was found to be insensitive to synergisms. Similarly, regression weights were insensitive to the presence of a true cross-product term. In contrast, the hierarchical test based on ΔR^2 was quite effective in differentiating between synergistic and nonsynergistic data.

Third, the approach here of simultaneous but separate simulations of environment (positive or negative intercorrelations), behavioral strategy (additive or multiplicative data rules), and regression analysis (linear or multilinear models) is notable. By using simulations, it was possible to investigate trends that would have difficult, if not impossible, to study empirically. Also, several previously unappreciated issues were identified, eg, the unexpected problems associated with generating r = 0.0 stimulus cue sets.

CONCLUSION: Why should researchers be concerned with these results? Among the many possible answers, one stands out. Across a variety of domains, experts have been found to employ synergistic response rules (Shanteau, 1992). For example, top auditors follow a linear strategy, but with exceptions that take the form of a multiplicative interaction (Ettenson, Krogstad, & Shanteau, 1984). Arguments that experts follow simple heuristics (Kahneman, 1991) or can be described by simple linear rules (Dawes, 1988) may be based on failures to recognize the interplay between negative environments, synergistic decision rules, and insensitive analytic strategies.

Of course, the argument here is entirely consistent with Brunswik's (1956) contention that analysis of behavior must reflect the environment in which it occurs. While

citing allegiance to Brunswik's ideas, many judgment analyses of experts have failed to appreciate the impact that synergistic behavior in negatively-correlated environments may have on behavior.

Finally, we recommend that simulations of environment-behavior-analysis be carried out before conducting a judgment study. This is particularly needed for research on experts who work in negatively correlated environments where synergisms are likely to occur.

For further information on this project, contact James Shanteau at shanteau@ksu.edu.

Content Analysis based on Brunswikian Concepts

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This study deals with content analysis where independent analysts extract phrases from a text according to rules laid down in a written instruction. The analysts are thus presented with a policy-document, a curriculum for nursing education, and asked to select text-excerpts they judged as mediating a distal meaning, defined in a written instruction as an aspect of nursing behaviour, namely "to take consideration to patients' basic psycho-social needs" which are concretized in the analysts' instruction. This need-goal aspect is also emphasized in official documents like national health laws.

Two judges, one a professional psychologist without any clinical experience, (judge No. 1), the other a registered nurse specialized in psychiatry (judge No. 2) made themselves familiar with the need-goal aspect as they were asked to make excerpts from the curriculum for nursing education. The excerpt should concern at least one of the following themes:

1. patient's psycho-social needs as defined in the need-list

2. social interplay in the nursing situation

3. patient's life history, e.g. relation to relatives

As computers are insensitive to contexts the task of deciding on boundaries of the recording units (proximal cues) was left completely to the single judge. The text elements were thus asymmetrically defined units. To decide if independently working analysts' recording-units could be regarded as identical or not with respect to distal meaning, a rule for judging equivalence between excerpts belonging to different judges was required. In this study excerpts from our two judges were treated as having identical distal meaning if they at least to some extent overlapped and were extracted from the same string of words. This rule enables frequency recording of common as well specific units. To make quantitative treatment of the data possible the data were tabulated in Venn diagrams, an arrangement that facilitates the study in detail of the judges´ disagreements, i.e. their specific non-overlapping excerpts.

The number of common and specific excerpts varies sharply between the two analysts for "General care of health and illness" and "Psychology and pedagogics". Since analyst No. 1 was a psychologist whereas analyst No. 2 a professional nurse these differences warrant a closer look. Do the analysts´ different professional education and expertise interact systematically with the kind of text they analyse?

For the subject "General care of health and illness" the professional nurse has selected 25 excerpts of which only 5 are specific units. The corresponding figure for the psychologist is 41 excerpts of which almost half, i.e. 19 are tallied as specific. This is an extraordinarily large difference. For the subject "Psychology and pedagogics" the difference is also striking. The psychologist has registered 29 excerpts. Only 2 of them are counted as specific. The nurse, on the other hand, has selected 47 excerpts of which 11 are specific.

A reasonable assumption would be that not being an expert on the subject to be analysed should call for caution about reading distal meaning into the text. However, our results point to the contrary. For both subjects the least knowledgeable analyst is more likely than the expert to read distal meaning into the text. Could it be that lack of expertise within a specific subject gives you cognitive freedom to read distal meaning into a wider range of written cue-material relating to that same subject than when the same text is analysed by a subject expert.

Further, a qualitative comparison between the analysts' specific excerpts suggests a tendency for the non-expert to read our need-goal aspect into concrete situations, e.g. "facilitating patients' family life", "instruction methods applied to practical situations", while the subject-expert is more inclined to select more abstract themes e.g. "principles of patient care",

"principles of motivation, activity, individualization and cooperation in instruction situations".

A copy of the full article is available on request from Lars Sjödahl le.sjodahl@swipnet.se

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Multiple Cue Probability Learning and Collective Judgement Processes

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Since a large portion of last year has been taken up by completing my PhD and finding a new job, my Brunswik-related research has dwindled somewhat. Hence, the following is more a promise of future work than a recollection of past work.

After completing my PhD in June 2005, I have recently started on a project with David Shanks investigating different computational models for individual learning in (nonmetric) multiple cue probabilistic environments. Part of this research will be concerned with the question whether different ecological environments instigate qualitatively different learning processes, or whether the learning process is more general, allowing for (quantitative) tuning to the environment. An important aspect of this research will be to separate the learning process from the response (i.e. judgement or decision) process. In doing so, and by using dynamical models, it will be possible to investigate how judgement strategies evolve over time (practice).

Besides this line of research, I have continued my work on collective judgement and decision processes in probabilistic multiple cue tasks. Currently, I am completing a theoretical analysis of different collective decision processes in such environments, in which information is distributed over group members. I investigated performance for a general class of weighted majority judgement processes, and compare the results of this theoretical analysis with empirical results gathered for my thesis (and discussed in the previous newsletter).

Effects of base rate, environmental uncertainty, values, and feedback on accuracy and performance in selection and detection decision making

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We are just beginning to collect data on an NSF funded project. Here is the abstract:

Many important decisions are based on cutoffs. For example, a doctor may suspect, but not be sure, that a child has an ear infection. If her suspicion is strong enough, then she might prescribe antibiotics. The doctor's suspicion is a judgment based on the child's symptoms, and antibiotics will be prescribed if that suspicion is strong enough, that is, if it is above some cutoff. Many types of decisions involve such cutoffs, e.g., police deciding to arrest suspects, juries deciding guilt or innocence, airport security deciding to detain passengers, emergency managers deciding to evacuate a hurricane-threatened area, personnel managers hiring job applicants, and social workers deciding to remove a child from the home. In each case, the decision to act or not is based on a judgment that must be made under uncertainty. Decisions can result in two kinds of error: a) acting when inaction is more appropriate or b) not acting when action should be taken. Such errors can be costly, and can never be avoided entirely, but understanding their causes can contribute to reducing them.

This project will investigate how people learn to make decisions when feedback is limited. Often the decision itself eliminates the possibility of feedback. For example, personnel managers rarely find out if applicants not hired would have been good employees. The research will be conducted using a laboratory procedure designed to simulate decision making conditions. Important properties of decision making situations will be varied, including the amount of uncertainty, the probability that the event of interest occurs, and the costs and benefits of errors and correct decisions.

The logistics of achievement: further lens model developments

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Recent modifications to the Brunswik lens model have been proposed to allow analysis of dichotomous judgments using logistic regression models. However, inconsistencies between predicted and measured accuracy have been observed and were discussed by Tom Stewart, Rob Hamm and myself at the last Brunswik meeting. To better understand the properties of the logistic lens model and the source of the inconsistencies, Tom Stewart developed a decomposition approach to derive an exact form of the logistic lens model equation in terms of covariances. To examine the differences between the approximate and exact logistic lens model, I did 1000 simulated analyses by randomly varying the judgments of a simulated environment with 100 cases and three cues (with weights 2, 1 and -1). In each simulation run, random error was introduced into the environment model to produce a range of environmental predictability. The median discrepancy between approximate and exact achievement was 1.5% with a 95th percentile of 3.6% and maximum of 6.5%. Re and Rs were the most important factors contributing to the size of the discrepancy, but together accounted for only ten percent of variation. Because most of the variation in the discrepancy between approximate and exact models remains unexplained, we recommend using the simpler, approximate form of the logistic lens model equation only after the size of the resulting discrepancy has been empirically demonstrated to be small.

An Egon Brunswik "Find"!

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Following my retirement from Bowling Green in May, I've spent most of my time at our second home in Beatty, Nevada, a small town on the edge of Death Valley National Park. Not much time for research just yet, but I did make a "find" in the antiquarian book world, by purchasing Egon Brunswik's copy of Shannon's "Mathematical Theory of Communication" (1949). His underlining and marginal notes indicate that he read most of the book quite carefully. Even more interesting, the copy has notes taken by Brunswik from a handful of library books (call numbers are included). These notes are actually more informative -- since he didn't own the books, he presumably had to take more extensive notes. The notes focus on Lotka's "Elements of Physical Biology" (1925) and Smart's "Stellar Dynamics" (1938), and briefer mention of other works. The notes promise to shed a lot of light on Brunswik's attitudes toward the beginnings of the cognitive revolution, as well as to the sources of his views on the use of mathematics and statistics in psychology.

Risk Communication, Trust, and Advice-based Decision Making

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We are working on a project involving judgments of trust in multiple advisors, which is informed by the Brunswikian perspective and the Lens Model. The project aims to investigate factors affecting advice giving and taking across various risk domains (such as recreation, transport, occupation, and drug use). Key themes within the project are differences between a) stated trust versus that revealed by the weight placed on particular advisors, b) self and other, c) similar and dissimilar advisors, and d) different advice presentation formats.

Participants make risk judgments based on multiple sources of advice, whose estimates are in turn based upon historical risk data. They then usually give advice to a friend, judge their friend's likelihood of engaging in the task, or judge that likelihood for themselves. Finally participants judge their trust in the various advisors, and the similarity between those advisors' values and their own (Earle & Cvetkovich, 1999).

Earle & Cvetkovich have argued that people place trust in advisors who demonstrate similar values in "value-bearing narratives". Our results show that people's stated trust in advisors does indeed correlate with judged similarity of values, but that their actual trust placement is based upon advisor accuracy.

Work continues on advisor features, advice presentation, characteristic patterns of advice quality, and other factors influencing judges' use of cues in a risk communication paradigm.

Earle, C., & Cvetkovich, G. (1999). *Social Trust and Culture in Risk Management*. In G. Cvetkovich and R. Löfstedt (Eds), *Social Trust and the Management of Risk.* London: Earthscan.

The Active Observer in a Sunk Cost Paradigm

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I have only recently been turned on to Brunswik's work and philosophy, but have found it particularly interesting and relevant for the study of decision making. One aspect that I have attempted to incorporate into the sunk cost decision making research is the active decision maker. I was fortunate enough to take a course in Ecological Psychology that emphasized J.J. Gibson's work and am now beginning to examine the similarities between the two approaches. Most studies to date, involving the sunk cost effect, have utilized the imposition of a decision environment, usually through scenarios read by the participant where a certain event has taken place. I have examined sunk cost decision making in terms of effort on part of the participant via a micro world simulation. Although financial incentives are not readily apparent in the work I've done, they can be added into the simulation. The main focus besides engagement of participant effort was to allow the participant to create the decision environment rather than having it imposed. Although basic decision processes can certainly be assessed from the confines of an artificial setting, my goal is to examine, as close as possible, how the world behaves outside the laboratory doors.

A new type of person profiles by the Representative Design

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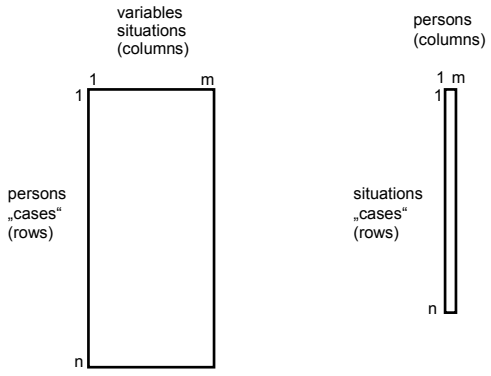
Between 1941 and 1955 Brunswik developed a new research method for psychology, labelled "Representative Design" (e.g., Brunswik, 1956), which was introduced as an integral part of his principal theory of "Functional Probabilism". Brunswik supposed that his unusual conceptualization of psychological science had to be combined with an adequate new methodology which was different from the standard approach.

In a technical perspective "Representative Design" consists of a 90^0-degree rotation of the original data matrix ("Classical Design"), which is defined by "n" persons (cases; mostly many) in the rows, and by "m" variables (or: "situations") in the columns (cf. the structure of the SPSS-matrix).

In the Representative Design, however, "n" (many) situations are regarded as the "cases" in the rows, whereas the (few) "m" persons are placed in the columns (cf. Figure 1). Therefore you have to take a lot of situations into account (broad ecology).

Figure 1

General structure of Classical and Representative Design



Of course the results obtained by the Classical Design are relevant, but they can be improved, enriched and enlarged in a complementary way by utilizing the method of Representative Design, in which the position of the situations is very strong (Brunswik intended in general a "psychology in terms of objects", from his early Vienna- to the late Berkeley-period). The sample of "n" objects (situations) is the basis for the description of single persons (individuals). This is a completely new perspective for the research of psychological behavior. The statistical routines and operations can remain identical (already proposed by Brunswik) but the interpretation of the relation between a person and the situations is new and different from the conclusions in the classical strategy.

How to utilize "Representative Design" in psychological research of 2005? In a longitudinal study, 142 six-year old children were recruited in 1997 (at the end of their kindergarten period) and 101 of them were followed up in 2001 when they were 10 years old (4th grade). One of the dependent variables, significant in Educational Psychology and measured on each occasion, was "persistence" (to remain being concentrated on one goal, to realize one topic consequently, to follow a matter determinedly) (Wolf, 2005). We plan to investigate persistence again in a third measurement-period when these youths will be 16 years old at the end of 2006.

What is the meaning of the statistical procedures in the context of the Representative Design?

Bivariate Correlation between two persons (not between two variables). If the correlation coefficient is highly positive, the persistence structure of these two persons is similar. If it is highly negative, these two persons differ in persistence.

Factor Analysis The loadings describe persons (not manifest variables) deriving latent dimensions of several persons. In a second step factor scores can be computed which consist of "r" person-dimensions in "n" situations.

Regression Analysis The criterion is one person, predicted by several other persons.

ANOVA The dependent "variable" is one person. The variance between "independent" groups can be defined in our study by the two age-levels (6 vs. 10) of the children.

Discussion

- In the Classical Design characteristics of situations (variables) are derived from the source of a large sample of persons.
- In the Representative Design characteristics of few persons are derived from the source of many situations.
- Profiles of situation-structures show significant peculiarities of persons.
- The same statistical tests lead to completely differing inferences in Classical vs. Representative Designs.
- A complementary combination of both strategies is indicated.
- The meaningfulness of the empirical results is enlarged by incorporating Representative Design.

Brunswik, E. (1956). Perception and the representative design of psychological experiments. Berkeley and Los Angeles: The University of California Press.

Wolf, B. (2005). Detailanalysen zur Persistenz mithilfe des Repraesentativen Designs. In S.R. Schilling, J.R. Sparfeldt & C. Pruisken (Hrsg.), Aktuelle Aspekte paedagogisch-psychologischer Forschung (S. 223-241). Muenster: Waxmann.

Emotions, elementary cognitive processes and decision making

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My main research interest is in emotion-cognition interactions, as well as the interactions of both emotion and cognition with the information structure of environment. Specifically, I am interested in function of emotions as modulators of information processing during decision making. Through experiments, I try to determine whether high emotional arousal increases the tendency to use simple decision heuristics. Usually, I study decision making in the lab, using a computerized multi-attribute choice task to see how

much information people search before making a decision, whether they integrate this information how they utilize cues of different importance, and whether these processes differ under different levels of emotional arousal.

I am particularly interested in the idea of *ecological rationality of emotions*. In this perspective, emotions are viewed as adaptive mechanisms, dedicated to solving distinct problems. The main assumption of this approach is that the workings of such adaptive mechanisms closely fit with the structure of the social or physical environments in which they operate. The idea of ecological rationality of emotions also stresses the fact that emotions are beneficial, rather than harmful, to the individual who experiences them – in specific circumstances, they greatly enhance decisions, leading to accurate choices and accurate behavior.

Empirical Investigation of the Rule-Based Lens Model

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Previous research effort has been focused on the development of a Rule-based Lens Model (RLM), which serves as the complement of the traditional linear-based lens model (which we termed as Compensatory Lens Model, CLM) under contingent conditions (Yin & Rothrock, submitted). The relationships between RLM and CLM parameters have been demonstrated via a simulation study in a hypothetical task. Results of the simulation show that a relationship between the unmodeled knowledge *C* for RLM and CLM exists and such relationship can potentially be used to differentiate compensatory strategies from noncompensatory rule-based strategies. However, we are mindful that simply fitting the data in a hypothetical domain does not necessarily validate our modeling technique.

Currently, we are engaged in the research of empirically validating our model through a laboratory aircraft identification task. One purpose for the experiment is to develop a framework to investigate the strategy of human judgment of a probabilistic criterion under systematically-varied environmental conditions. In the study, we are interested in the influence of task ecology, time pressure, and task workload on the judgment strategies used and how the changes of the strategies can be characterized by the RLM and CLM analysis. Overall, we will conduct three sets of experiments. In the first experiment, we create two sets of probabilistic environment with different organizing principles – linear and rule-based. In this experiment, we are also interested in investigating the impact of different cue representations (continuous vs. categorical) on the changes of judgment strategies. For experiment two, we have environments with high and low time pressure and in experiment three, we have environments with high and low task workload. Through all the three experiments, we want to validate that RLM will provide a better model fit in conditions which are believed to prompt the use of rule-based strategies.

Prior to the actual experiment, we plan to run a pilot study for the purpose of establishing the number of trials needed to sufficiently train subjects on the experimental tasks. Training is an important concern of this study because we only want to analyze the results under subjects' steady performances. A 2X2 factorial design is employed in the pilot study to test the effect of different task ecologies and cue representations on time required for the training sessions.

Through the experimentation, we want to empirically validate RLM and demonstrate its strength in modeling decisions under contingent conditions where the use of CLM is inadequate. This would provide us of valuable insights into the integrative formulation of RLM as the complement of Lens Model Equation in the CLM context.

Yin, J. & Rothrock, L. (submitted).A Rule-based Lens Model. *International Journal of Industrial Ergonomics.*

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Tentative Agenda

The 21st Annual International Meeting of the Brunswik Society
Wentworth Room, Sheraton Centre Hotel, Toronto, Canada
November 10-11, 2005
http://www.brunswik.org/annualmeetings/meet21.html

Thursday 10th 2005

12.00 – 12.45 Late registration
12.45 – 13.00 Welcome (Jim Holzworth, Mandeep Dhami, Elise Weaver, Tom Stewart)

Paper session 1

Exposition of Brunswik's and Hammond's ideas (Chair: Mike Doherty)

13.00 – 13.30 Bernhard Wolf
The basic lens model as a paradigm of cognitive processes in individuals
13.30 – 14.00 Ben Backus
Cue recruitment and visual appearance: effect of Pavlovian conditioning on the construction of percepts
14.00 – 14.30 Rob Hamm
What if the judge uses two distinct judgment policies?
14.30 – 15.00 Amy Reese & Jim Holzworth
Individual differences and the cognitive continuum

15.00 – 15.15 Tea & coffee break

Paper session 2

Applications (Chair: Clare Harries)

15.15 – 15.45 Jamie Brehaut, Robert Wigton & Ian Stiell
A single-model analysis of use of clinical decision rules among emergency physicians
15.45 – 16.15 Christine Huttin
New cost sensitivity index based on cognitive cost cues for an application of the lens model on physician's choices
16.15 – 16.45 Marcio Carvalho
Federal representatives' judgments in the Brazilian congress
16.45 – 17.15 Phil Dunwoody, Dennis Plane, David Drews, Devin Rice & Alexander Rinehart
Judgments of potential threat to US citizens or interests
17.15 – 17.45 J. Mclennan, A. Holgate, Mary Omodei & Alex Wearing
Decision making in bushfire incident management teams

17.45 Adjourn
19.00 Group dinner at Christina's.

Friday 11th 2005

08.30 – 09.00 Breakfast

Paper session 3

Methods (Chair: Neal Dawson)

09.00 – 09.30 Robert Wigton, Benjamin Miriovsky, Thomas Tape & Devin Nickol
A new method for analysis of judgment policy using sequential selection of cues in clinical vignettes

09.30 – 10.00 David Weiss
Individual performance and team functioning
10.00 – 10.30 Elise Weaver
Importance weight motion as a function of prior distance to advice

10.30 – 10.45 Tea & coffee break

Paper session 4
The lens model and heuristics (Chair: Mandeep Dhami)
10.45 – 11.15 Konstantinos Katsikopoulos
Connecting lens models and fast and frugal heuristics: Focus on processes
11.15 – 11.45 Robin Hogarth & Natalia Karelaia
On heuristic and linear models of judgment: Mapping the demand for knowledge
11.45 – 12.15 Bettina von Helversen & Joerg Rieskamp
How people estimate a continuous criterion: Does the environment influence which strategy is chosen?
12.15 – 12.45 Thorsten Pachur
Cues or instances: What is used for inferences about event frequencies?

12.45 – 13.00 Break to pick-up lunch

Lunch panel Future of the Brunswik Society (Chair: Ken Hammond)
13.00 – 15.00 Ken Hammond, What's ahead for the Brunswik society?
Discussants: Phil Dunwoody, Jeryl Mumpower, Mandeep Dhami

Paper session 5
Choice and judgment (Chair: Tom Tape)
15.00 – 15.30 Gary McClelland, Bruce Pfeiffer & Donald Lichtenstein
The ecology of price and quantity
15.30 – 16.00 Claudia Gonzalez-Vallejo
Understanding preferences from Thurstonian and Brunswikian perspectives

16.00 – 16.15 Tea & coffee break

Paper session 6
New solutions to old problems (Chair: Jeryl Mumpower)
16.15 – 16.45 Nigel Harvey
Trend-damping in judgmental forecasting: An ecologically appropriate behaviour?
16.45 – 17.15 Rocio Garcia-Retamero, M. Takezawa, M. Gummerum, & Gerd Gigerenzer
When Individual Learning is not Enough: Social Learning in Group Decision-Making
17.15 – 17.45 James Shanteau
Overconfidence vs. self-confidence in experts

17.45 – 18.00 Hammond-Brunswik New Investigator Award
(presented by Ken Hammond)
18.00 Farewell