The Brunswik Society NEWSLETTER

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Edited by Lars Sjödahl, le.sjodahl@swipnet.se

This newsletter contains an impressive variety of research areas, all related to Egon Brunswik's theoretical and conceptual world.
All contributions concern human perception and adjustment to a complex ecology.
Grateful thanks to my wife, Gillian, for language checking and support and to Esther Kaufmann, University of Mannheim, for professional help with proofreading, the layout and downloading of the contributions.

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Contributions:

Evaluation of Advanced Automated Geospatial Tools

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I have been working this past year with colleagues and students at George Mason University to conduct experiments assessing the value added of geospatial tools to military decision-making. The tools are being developed by the U.S. Army's Topographic Engineering Center to support soldiers' understanding and utilization of terrain and weather information. Our experiments use active-duty military personnel and problem scenarios representative of actual planning environments. The initial results of the first experiment, which showed substantial reduction in the time required for terrain analysis tasks, can be found in the following reference:

Laskey, K.B., Powell, W.A., Adelman, L., Hieb, M., & Kleiner, M. Evaluation of advanced automated geospatial tools. *Proceedings of the 12th International Command and Control Research Technology Symposium*, 25-27 June 2007, Newport RI.

News from Ben Backus

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Ben Backus has moved his lab to the SUNY College of Optometry in Manhattan, where he and his students are studying cue recruitment in the visual system under grants from the Human Frontier Science Program and (as of July) the NSF. JDM folks may remember that Brunswik developed the notion of a cue's ecological validity to explain the perceptual system's choices - i.e. to explain appearance.

Recent work (Backus & Haijiang, 2007) showed that a newly trained visual cue traded with a long-effective cue during a perceptual decision about a Necker cube's rotation direction.

Ben says: Best wishes to all of you, my fellow Brunswikians!

Reference:

Backus, B. T., & Haijiang, Q. (2007). Competition between newly recruited and preexisting visual cues during the construction of visual appearance. *Vision Research, 47,* 919-924.

News from Jason W. Beckstead

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This year I have been working on a few things that may be of interest to fellow Brunswikian researchers

1. In a paper, currently under review in *Medical Decision Making*, I have proposed a modification to the Lens Model Equation for use in judgment analyses that employ clinical prediction rules (not actual outcomes) as ecological criteria:

$$r_{a'} = GR_s + (r_{Ysz\,Y'e})(r_{Ysz\,Ys})$$

where the second term refers to the product of the correlations between the residuals from the judgment model ($Y_{sz} = Y_s - Y'_s$) and the predicted criteria (Y'_e), and between these residuals and the judgments, respectively. This term represents that portion of the judge's knowledge of the clinical prediction rule that is not captured by his or her judgment model. While not an index of true achievement in the traditional Brunswikian sense, $r_{a'}$ does allow us to examine individual differences in accuracy relative to a clinical prediction rule or other gold standard.

2. In the October issue of the online journal *Judgment and Decision Making*, I have drawn attention to the issue of type II error in regression models of judgment. In many judgment studies, testing the significance of regression coefficients is relied upon to decide whether or not specific cues are attended to by the judge or decision maker. This practice is dubious because it ignores type II error. In this note I *a)* to draw attention to this issue, specifically as it appears in studies of self-insight, *b)* illustrate the problem with examples from the judgment literature, and *c)* provide a simple method for calculating post-hoc power in regression analyses in order to facilitate the reporting of type II errors when regression models are used.

3. Results of an applied judgment analysis "Understanding how nurse practitioners estimate patients' risk for coronary heart disease", preliminary findings of which were presented at last years meeting, were recently published in the *Journal of Advanced Nursing*.

4. Currently, I am interested in the effects of serial nonindependence in single-subject data when analyzed with multiple regression. What psychological processes introduce such nonindependence into judgment data? How might time-series methods be used to detect (and possibly correct for) the influences of such processes in order to meet the assumption of independence in regression analysis?

5. I continue to be interested in extending the Lens Model to accommodate mediational relationships. When individuals integrate cues to form a proximal judgment and then, in turn, rely on this proximal judgment as well as the cues to form a related distal judgment, the Lens Model may be described as being "bifocal". This approach holds promise for investigating sequential vs. parallel cognitive processing of information in complex judgment tasks.

News from Mike Doherty

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Rich Anderson and I have been investigating the perception of correlation. The research is not in the idiographic tradition of Brunswik, but it is informed by general Brunswikian propositions, especially in its recognition of the crucial role of uncertainty, environmental structure and representative design, and the assessment of achievement as the behavior of interest.

1. In a series of studies using both classical and contemporary psychophysics, we have shown that scatter plots representing high correlations are more discriminable that those representing low correlations, and

2. that the received view that point estimates of correlation are positively accelerated functions, but systematic underestimates, of typical statistical indices is an overgeneralization. This research is in press in *Perception and Psychophysics*.

3. Valid judgments of the presence of correlation can be inferred from a single xy observation, if the univariate characteristics are known. This work was reported last year, but we have shown a similar effect with graduate students and statistically naïve undergraduates. This work is under review in *Cognitive Science*.

4. We have continued working on the phenomenon originally explored by Kareev on the "small window" advantage. Our original work on that was published in *Psychological Review* in 2005, as was a paper by Juslin and Olsson and a rejoinder by Kareev. In the interim, we extended Kareev's finding to the perception of means (Anderson & Doherty, 2007, *Memory & Cognition*). In that paper we argued that the original attribution to the increasing asymmetry of the sampling distribution as n decreases is not the most likely explanation, but rather it is the concomitantly increasing variance of those sampling distributions.

5. Continuing in this line, we have followed-up on our theoretical, simulation-based work (dealing with the detection of population correlations and population means) with a set of behavioral, signal detection studies showing an advantage for large rather than small samples. In investigations of the effect of sample size on correlation estimates, we found a general tendency for the magnitude of estimates to increase with sample size (this was unexpected in light of our previous theoretical work) and that this effect may be moderated by participants' working memory capacity. This work is under review.

6. In investigating the effects of random sampling on illusory correlation we have found - contrary to existing literature - that people are remarkably accurate in the detection of correlation. With the stimulus data composed of negative and positive social characteristics of a hypothetical majority and minority group, and with the stimulus samples exhibiting either a zero or random correlation, our participants' correlation estimates were unbiased in the zero-correlation conditions, and yet responsive to randomly varying correlations in the other conditions. We are pursuing a possible explanation in terms of the uncorrelated data have been presented in the context of other, correlated sets of data.

What Makes the Best Diagnostic Tutorial: Probabilistic Prototypes, Discriminating Contrasts, or Simply More Cases?

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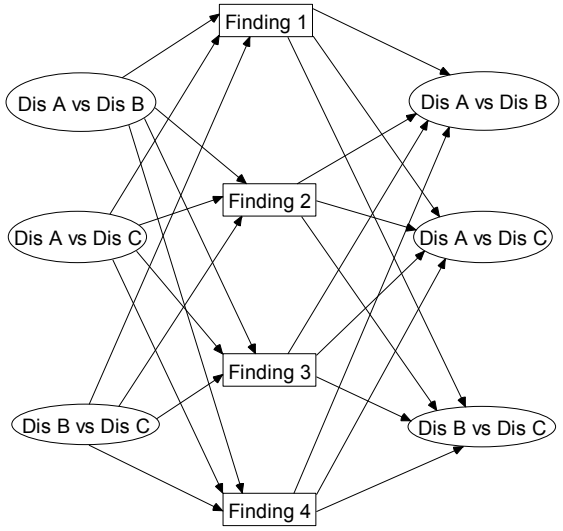
I would like to revisit the topics of two presentations I made at past Brunswik Society meetings. First, the paper related to my 2005 presentation "What if the judge uses two distinct judgment policies?" has been published (Hamm, 2007), in a volume which includes a great variety of different perspectives on intuition with multiple nods to Hammond's work, and occasional uses of Brunswikian vocabulary. Glockner (2007), for example, explores the range of intuitive to analytic approaches to estimating the size of named cities from recalled proximal cues.

In collaboration with Rick Thomas of the University of Oklahoma's Psychology Department, Cleotilde Gonzalez of Carnegie Mellon University's Department of Social and Decision Sciences (the lead PI on our NSF grant), and Frank Papa of the Texas College of Osteopathic Medicine, and their graduate students and colleagues, we are studying dynamic decision making in medicine. Dynamic elements of decision making include changes in the patient's health state, and changes in the physician's knowledge of the patient's health state (whether or not that state is changing). Aspects we are interested in include learning to diagnose, to seek information, or to treat appropriately; and tuning performance toward the optimum.

Second, I have been working with Frank Papa, who presented at the 2006 Brunswik Society meeting, using his materials for teaching medical students diagnostic categories. We have data from one study on learning the basic task in dynamic diagnosis. I'd like to describe it in Brunswikian terms, as a theoretical exercise for myself that may be instructive for all of us, using a graph I presented at the 2006 meeting. In clinical diagnosis, physicians consider multiple diagnoses for a patient with a given presentation (such as "chest pain"). As information about the patient's unique set of clinical characteristics is sought and found, obviously the set of diseases still in consideration changes. That can be restated as, "the set of pairs of diseases still in consideration" changes.

An adequate Lens Model approach here can not simply look at the association between a single disease and its cues (signs, symptoms, findings); nor even at such support for several diseases in parallel. Rather, I propose it must look at the relative support for multiple pairs of diseases. Focusing on a pair of diseases allows the question to be "Disease X or Disease Y" rather than "Disease X or not." Thus, if a patient's signs and symptoms are similar both to Angina and to Myocardial Infarction, then it is important to consider them both explicitly. Further, often we must consider several such pairs, because that same patient may have features that are suggestive of both Angina and GERD. This is represented in the first figure by multiple environmental nodes (left side), each representing the competition between a pair of diseases, and multiple subjective nodes (right side), representing the physician's ideas about the relative

likelihood of the corresponding pairs of diseases. We need not consider all possible pairs of diseases, as some pairs are not similar enough that physicians confuse them.



Using the model differently from the Lens Model, to describe current processing rather than to summarize knowledge, we might imagine the right side as representing activation of ideas or of judgment concern and attention, which can change dynamically as the physician learns and reasons about a patient. Initially, any pair of diseases is pertinent and potentially active; as information is sought and found, some pairs become irrelevant (the case has features of neither), some pairs become decided (clearly more like the one than the other), and some pairs are still active and undecided. Further information acquisition aims to "decide" the still active pairs, to establish a domination of one or the other of the diseases in those pairs. Finally, we'd hope the same disease dominates in every pair; rather than there being intransitivities.

One completed study, done last summer by students Jonathan Mui and Adrienne Li, addressed methods of teaching clinical students to diagnose cases. Our paper-based tutor, which uses elements of Frank Papa's computer tutor (www.acdet.com) and cases provided by Frank Papa and David Aldrich, covers 6 chest pain causes, offering only clinical signs and symptoms (not laboratory tests or diagnostic procedures). The information we give may be considered cognitive "feedforward", explaining the environmental models for the various diseases and disease pairs.

Our study looks for differences in improvement (from pre-test to post-test) due to 5 tutorials to which the students are randomly assigned. Three tutorials explicitly provide information about the typical signs and symptoms of the diseases. One of these gives the probabilistic prototype "**p**" of each disease (findings listed in order of their sensitivity, i.e., the probability the disease has the finding; but displayed with 3 ordinal labels). Example cases are given, accompanied by the probabilistic prototype with the case's findings highlighted. A second condition contrasts the finding lists of two diseases, identifying the findings that both have in common (non-discriminating) and the findings that are in the correct disease more frequently than in the competing disease (discriminating, "**d**"). Example cases are provided, with the matching and contrasting features present in each case highlighted. By the theory sketched above, this should be the most useful training. A third condition provides both prototype and contrast information "**pd**", again with cases.

There are also two control conditions (textbook extracts "**t**"; and text plus cases "**tc**").

We conducted the study with over 60 students from clinical programs (medicine, physician assistants, nursing) and from science graduate programs. The corresponding

improvements in proportion correct are shown in the second figure.

The ordinal results support our predictions, with the exception that the information about the contrast or discrimination between two confusable diseases "**d**" is not more helpful than the information about single diseases' prototypes "**p**". However, the strongest effect is the presence of example cases (which only the "**t**" control lacked). We have redesigned the study to vary the number of cases (0, 1, or 4) independently of the prototype, contrast, and text information. I'll tell you about it next year.

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Hamm, R. M. (2007). Cue by hypothesis interactions in descriptive modeling of unconscious use of multiple intuitive judgment strategies. In H. Plessner, C. Betsch & T. Betsch (Eds.), *Intuition in Judgment and Decision Making* (pp. 55-70). Mahwah, NJ: Lawrence Erlbaum.

News from Kenneth Hammond

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Currently I am working on two projects: a paper that attempts to reconcile the opposing views about rationality in the cognitive science community, and a paper that develops further theory about coherence. Both will lean heavily on Brunswik inspired cognitive theory.

A Naïve Sampling Model of Intuitive Confidence Intervals

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A particular field in research on judgment and decision making (JDM) is concerned with realism of confidence in one's knowledge. An interesting finding is the so-called *format dependence effect*, which implies that assessment of the same probability distribution generates different conclusions about over- or underconfidence depending on the assessment format. In particular, expressing a belief about some unknown continuous quantity (e.g., a stock value) in the form of an intuitive

confidence interval is severely prone to overconfidence as compared to expressing the belief as an assessment of a probability judgment.

This thesis (Hansson, 2007), Study 1, gives a tentative account of this finding in terms of a *Naïve Sampling Model*, which assumes that people accurately describe their available information stored in memory, but they are naïve in the sense that they treat sample properties as proper estimators of population properties (Juslin, Winman, & Hansson, 2007). The effect of this naivety is directly investigated empirically in Study 2 (Winman, Hansson, & Juslin, 2004). A prediction that short-term memory is a constraining factor for sample size in judgment, suggesting that experience per se does not eliminate overconfidence is investigated and verified in Study 3 (Hansson, Juslin, & Winman, 2007). In Study 4 (Hansson, Rönnlund, Juslin, & Nilsson, 2007), age-related increments in overconfidence were observed with *intuitive confidence interval* but not for probability judgment. This thesis suggests that no cognitive processing bias (e.g., Tversky & Kahneman, 1974) over and above naivety is needed to understand and explain the overconfidence "bias" with intuitive confidence interval and hence the format dependence effect.

References:

Hansson, P. (2007). *A naïve sampling model of intuitive confidence intervals*. Doctoral dissertation from the Department of Psychology, Umeå University, S-901 87 Umeå, Sweden. ISBN: 978-91-7264-368-0. Parts of the thesis are availably at: http://www.diva-portal.org/umu/theses/abstract.xsql?dbid=1354

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Brunswikian Research at the University of Connecticut

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We are working with Tom Stewart (University at Albany) and Jeryl Mumpower (Texas A & M University) on a project concerning how people learn to make decisions when feedback is limited. Please refer to Tom Stewart's report for specific details concerning this project. We are framing our work at UConn within the context of personnel selection.

We continue to be interested in how individual differences related to judgment and decision making. Amy Reese is preparing a dissertation prospectus concerning individual differences in cognitive style in a dynamic decision making task. Kris Korbelak's dissertation is concerned with individual differences in coping with stress. Kathlea Vaughn is designing a dissertation concerned with group judgment and decision making. Claire Rickards is investigating

differences in learning style in her master's thesis. All of these projects are in the design stage. We hope to have much more to report next year.

Determinants of Linear Judgment: A Meta-Analysis of Lens Model Studies

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Over the last year, we have been working on a meta-analysis of studies that measure the accuracy of human judgment within Brunswik's (1952) lens model paradigm. We have recently finished a revised version of the manuscript that summarizes judgments of 5,079 participants from 86 papers. We take this opportunity to express our gratitude to many researchers from the Brunswik Society who answered our numerous inquiries and requests for data and provided us with many constructive comments on earlier versions of the manuscript. The spread-sheet that details the coded data on which our analysis is based is available at *http://www.hec.unil.ch/karelaia/.* Below we provide an extended abstract of this work.

In a seminal contribution, Hammond (1955) suggested using the conceptual framework of Brunswik's (1952) lens model to study processes of clinical judgment. Since then, many researchers have used the same measures for capturing the contribution of different factors that determine the accuracy of human judgment within the lens model paradigm. How good are people at making judgments and what factors affect this? What are the main differences between laboratory and field studies? How effective is learning and what is the role of feedback in this process? How does expert judgment differ from the judgment of novices? When is bootstrapping – or replacing judges by their linear models – advantageously superior to unaided human judgment?

We answer these and other questions by conducting a meta-analysis of statistics of the "lens model equation" (Tucker, 1964) associated with 249 different task environments obtained from 86 papers that appeared between 1954 and 2007. We excluded from consideration experimental reports that failed to model the environmental side of the lens, research within the conflict resolution paradigm in which the criterion for one person is the judgment of others, and studies where the unit of analysis was aggregate (typically mean) as opposed to individual judgments. The total number of individual judgments on which our results are based is about 303,000.

In short, we find – on average – fairly high levels of judgmental achievement and note that people can achieve similar levels of cognitive performance in both noisy and predictable environments. Linear models capture similar proportions of variance in environmental outcomes and human judgments (around 80% on average). However, between-study heterogeneity is considerable and we thus further identify and estimate the effects of task characteristics that influence judgment.

We find that levels of performance are lower when the number of cues is large, the cues are

inter-correlated, and the ecology contains non-linearities or additive non-compensatory cue weights. In addition, task environments in laboratory studies in our sample contain less noise than those in field studies that represent decision makers' natural ecologies. Moreover, laboratory – but not field – studies with high environmental linear predictability tend to report higher judgmental linear predictability (i.e., consistency).

As to expertise, our data does not suggest that experts, as defined by being familiar with the task *ex ante* and having made similar judgments before, match environmental models better than novices. Nor do experts rely more than novices on configural, non-linear judgmental strategies. Thus, both expert and novice judgment can be well described by simple linear models although we do find some evidence that experts may be more consistent than novices in applying their decision policies.

Regarding learning, we find that decision makers are capable of learning when they repeat the task over multiple trials. Judgmental consistency, however, is the least sensitive component of the lens model indices to learning. As to feedback, it is task information that improves learning, while cognitive feedback does not help. Outcome feedback, when provided alone, has a negative effect on judgmental consistency, and no effect on either matching or overall judgmental accuracy. In addition, people respond to feedback more when inter-cue redundancy is low.

Our data show that the inconsistency that people exhibit in making judgments is sufficient for models of their judgments to be more accurate than they are themselves. That is, eliminating inconsistency outweighs the benefits of idiosyncratic knowledge that is not captured by linear models. However, there are limitations in applying bootstrapping models: in 30 of 236 studies for which the advantage of bootstrapping models could be measured, unaided human judgment was superior to the accuracy of judges' models.

We conclude by indicating shortcomings of the kinds of studies conducted to date, limitations in the lens model methodology, and possibilities for future research. We stress that one research challenge within the lens model paradigm is the systematic use of representative design. With more flexible technology, and clearer ideas of how knowledge can be accumulated, Brunswik's lens model has the potential to unlock many further insights about human judgmental processes.

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A Division of Labor Hypothesis: Adaptations to Task Structure in Multiple-Cue Judgment

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In this thesis behavioral experiments, cognitive modelling and brain imaging are used to investigate an adaptive division of labor between multiple memory representations in multiple-cue judgment. It is hypothesized that the additive, independent linear effect of each cue can be explicitly abstracted and integrated by a serial, additive judgment process (Einhorn, Kleinmuntz & Kleinmuntz, 1979). It is further hypothesized that a variety of sophisticated task properties, like non-additive cue combination, nonlinear relations, and inter-cue correlation, are carried implicitly by *exemplar-memory* (Medin & Schaffer, 1978; Nosofsky, 1984; Nosofsky & Johansen, 2000). Study I and II investigate the effect of additive versus non-additive cue-combination and verify the predicted shift in cognitive representations as a function of the underlying cue-combination rule. The third study is a review that discusses the nature of these representational shifts; are they contingent upon early perceived learning performance instead of automatic and error-driven? Study IV verifies that this shift is evident also in the neural activity associated with making judgments in additive and non-additive tasks.

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Call for More Combined Idiographic-Nomothetic Research on Judgment Achievement

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An important neglected criticism of research on judgment and decision making concerns the fact that most studies are based on the nomothetic approach. In our research on judgment achievement decomposed by the Lens Model Equation (Tucker, 1964) we have also considered the idiographic research approach (see Kaufmann, Sjödahl, Athanasou, & Wittmann, 2007). Consequently we are interested in if the idiographic approach is also neglected in studies on judgment achievement and how many studies compare the nomothetic with the idiographic approach.

After a comprehensive literature search we found 35 studies (N) on judgment achievement. They encompass 1 221 persons who judged 53 tasks (32% medical science, 21

business science, 11% educational science, and 14% miscellaneous research areas, for more information see Kaufmann & Athanasou, 2007).

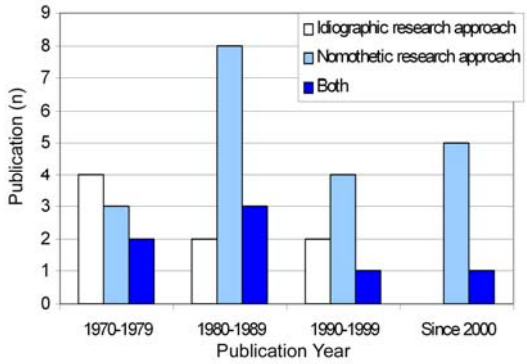

Figure 1. The number of publications separated by their research approach idiographic vs. nomothetic, or both in the research on judgment achievement.

As can be seen in Figure 1, our study analyzes both idiographic and nomothetic research on judgment achievement. We considered studies as idiographic when they generated a correlation between judgments and criteria within each individual before presenting any aggregate or nomothetic measures of relationship. It is notable that in two studies only the most accurate judge is reported, and these are included as studies using a nomothetic approach.

To summarize, Figure 1 shows clearly the continuing value of the Lens Model Equation for judgment analysis over a period of more than 30 years. However, most studies in our sample used a nomothetic research approach (n = 20), an idiographic research approach was seldom used (n = 8). Moreover, only a few studies compared the two research approaches (n = 7). Three of these seven studies were found in medical publications, two in business and two in educational science.

Although we are aware of the limitation of our sample which only focuses on judgment achievement and does not included feedback or learning studies, we feel there is reason to call for more combined idiographic-nomothetic research on judgment achievement.

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A Critical Meta-Analytic Perspective of the Components of the Lens Model Equation in Judgment Achievement

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The major purpose of probabilistic functionalism is to appraise the "… interplay and relative contribution of environmental factors in the (organism's) adjustment to a given ecology" (Brunswik, 1956, p. 143). The Lens Model Equation (*LME*) is of utmost importance, because it permits the precise analysis of the "interplay" (Hammond, 1966, p. 72). Judgment achievement is a measure of how well the judges interact with the environment. To find out how judgment achievement is across studies in different domains of human decision-making, a meta-analysis according to Hunter and Schmidt (2004) was conducted. This meta-analysis method allows the correction of judgment achievement in regard to error and bias. As the Lens Model, and therefore also the *LME,* is based on the assumption of some isomorphic relation (symmetry) between the environment and the cognitive system, we also focus on the concept of symmetry (see Wittmann, 2002; Wittmann & Süss, 1997).

Actually, two projects are under preparation, which are finally combined.

The first project describes the judgment achievement of individuals by meta-analysis (see Kaufmann & Sjödahl, 2006; Kaufmann, Sjödahl & Mutz, 2007). Further analysis and publications considering influence factors on judgment achievement are in preparation.

A second project describes judgment achievement at the group level (see Kaufmann & Athanasou, 2007). As an example, Figure 1 indicates that the average value of components of the *LME* varies amongst studies in separate research areas. Judgment achievement varies from a low (.22, psychological science) to a high (.58, other research areas) level. Therefore, our results support the hypothesis that judgment achievement and the component of the *LME* across studies are clearly not stable at first glance.

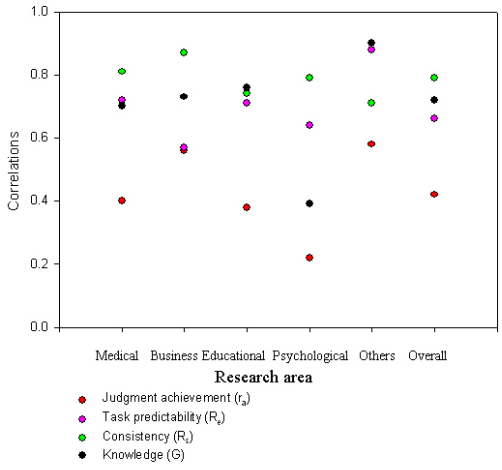

Figure 1. The correlation components of the *LME* separated into the applied research areas.

Finally, it is a great honor for us to present our results at the annual conference of the Brunswik Society in Long Beach, California, in more detail. However, further analysis is needed to reveal the complexity behind judgment achievement (see also Karelaia and Hogarth, 2007).

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News from Alex Kirlik

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At Illinois, our research continues on the often intimate interdependence between human cognition and today's predominantly technological ecology (e.g.:http://www.beckman.uiuc.edu/news/articles/feature090507.html).

Two projects of possible interest to the Brunswik Society include our work mining the Hurricane Katrina evacuation decision for lessons learned (in particular, lessons concerning the design of the decision support system available to emergency response managers), and our work designing and evaluating a novel approach to joint, human-computer judgment that outperforms both unaided human expertise and computer models alone.

Our Katrina project (joint with meteorologists, forecasters, and operations researchers at the Naval Postgraduate School) is grounded in a detailed analysis of screen captures from the "Hurrevac" decision support system as Katrina neared landfall, and a U.S. Dept. of Commerce post-hoc assessment of National Weather Service and National Hurricane Center performance during the event. Two findings of interest: 1) Like a smoke alarm that sounds every time you make toast, the design of Hurrevac

makes evacuation timing recommendations to users that always assume a worst-case scenario (a direct strike on one's own location) regardless of the forecast probability (provided by the NWS and NHC) of a strike at the user's location.

As such, the burden falls entirely on human judgment to temper evacuation. Recommendations made by the decision support system with knowledge of strike likelihood. 2) In Katrina, the official U.S. Government assessment concluded that New Orleans was given 56 hrs. advance warning of a strike, even though an analysis of Hurrevac screen shots shows that the displayed Katrina strike probability for New Orleans was just 1 in 6 at this lead time.

In our interactive judgment research, at the start of the 2007 baseball season, we recruited "fantasy" baseball experts with years of experience to predict the 2007 performance of MLB players in terms of fantasy "dollar" (auction bid) values. Based on our previous studies of computer-based decision support, we hypothesized that even experts would have difficulty tailoring the severity (range, variance) of their predictions to the different levels of predictability of various performance statistics (cues) from year to year (for hitters: home runs, batting average, runs batted in, runs scored, stolen bases; a different but analogous set of quantities for pitchers). We created a judgment support systemconsisting of a visualization of a linear-additive bootstrapping model for predicting player dollar values that allowed expert participants to tweak, or override, the default model predictions based solely on past performance cues. These interactively created predictions were then adjusted to automatically correct any such overrides to optimally regress predictions to the mean, as a function of the predictability of each cue from year to year. Our results show that the group of participants provided with this combination of a bootstrapping model and a statistical visualization to foster optimal regression-to-the-mean outperformed a similar yet unaided group of expert participants and ESPN fantasy baseball experts. ESPN experts demonstrated no regression to the mean in their year-to-year predictions (s.d. 2007 predicted dollar values = s.d. actual 2006 dollar values), even though year-to-year player performance is quite variable. In contrast, analysis of our data using Murphy's skill score measure indicated that our aided participants achieved a regression bias near zero. We are in the process of analyzing whether the superior performance of our aided participants could also have been due to the ability to tweak case-specific (player specific) default (prior performance) cue values based on late-breaking news (player injuries, recoveries, etc.) and any other information not included in our bootstrapping model based solely on a player's performance the previous season.

Calibration Adjustment in Experts and Non-Experts in Mathematics

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A collection of ecological experiments were conducted in coherence with the probabilistic mental models theory or PMM (Gigerenzer, Hoffrage & Kleinbölting, 1991) to test its predictions for calibration in experts and non-experts in mathematics. The match between subjective and objective success was achieved, although, without applying a representative set of tasks (Dhami, Hertwig & Hoffrage, 2004). A recently developed test in mathematics (Cortada de Kohan & Macbeth, 2007) for argentine university students was administered to measure objective success and to compare it with subjective success judgments. Results were consistent with PMM theory. Since the test was hard for non-experts and produced the overconfidence effect among them, the same items produced a good calibration among experts. This result is understood as an ecological phenomenon. The calibration task was more ecological for experts than for non-experts because experts are used to take decisions and monitor their performance in that domain. Though, the critical variable was not the objective success. Another experiment was conducted to differentiate between performance in mathematics and performance in calibration for mathematical tasks. One group of non-experts was trained in tasks that were similar to the test in mathematics used in the experiment. This group received feedback about their performance in the training. Another group of non-experts was trained using the same method but also was asked for calibration judgments. This second group received individual feedback about their performance in the training and their performance in calibration. The first group improved the objective success but still incurred in the overconfidence effect. The second group also improved the objective success but, in contrast to the first group, produced a good calibration that resulted very similar in effect size to the calibration of experts.

The conclusion is that the overconfidence effect disappears among non-experts when a representative sample of tasks is applied, as reported in previous ecological studies (Gigerenzer et al., 1991; Dhami et al., 2004), but also when experimental subjects receive a simple training in calibration and a hard test is administered. When the training is limited to improve the objective success without a systematic calibration improvement, the dissolution of the overconfidence distortion does not occur.

To summarize, when a representative sample of tasks was not applied and the objective success was measured by a hard test in non-experts in mathematics, the ecological match between cognition and environment (Gigerenzer, 2007) for calibration could be achieved through a fast and simple training on calibration.

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Risk, Ambiguity, and Information Use in a Decision Dilemma

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In the Applied Psychology Laboratory, we continue to focus on factors impacting the use of information in decision making. Lab studies of risky decision making typically incorporate a single clearly-defined, isolated risk. It is not likely that risks will always be so clear-cut or discrete. More often, different choices will lower some risks but increase others. Knowing how people process cues and information is particularly important in situations for which there is not a clear 'right' answer – as in jury deliberations or ethical dilemmas. Dealing with unethical behavior in an organization is another example of such a situation. Prominent examples such as Enron and the tobacco industry have illustrated the trade-offs of reporting such behavior – individuals put themselves at great personal and professional risk in order to reduce risks to society and 'blow the whistle' on the organization. In our most recent study, we used the situational context of purported unethical organizational behavior to examine how people make these trade-offs and what specific information and cues people use to make a whistle-blowing decision. We investigated the relationship among particular features of the judgment context – specifically cue ambiguity, risk to self, and risk to society – information search strategies, and ultimate decision.

We used a repeated measures 2x2x2 (*cue ambiguity* x *risk to self* x *risk to society*) design. Participants responded to eight scenarios, variations of potential 'whistle blowing' situations, in which some unethical organizational behavior *might* be occurring. Below the scenario stem were boxes containing additional cues and information on risk to self, risk to society, and ambiguity, as well as some cues that were not directly relevant to the unethical behavior. Each box label contained a short phrase representing the cue type, and clicking on the box revealed the information inside. *Cue ambiguity* (high vs. low) was manipulated by including cues and information that were either highly ambiguous (e.g., hearsay, brief glimpse) or not ambiguous (e.g., direct observation, written evidence) diagnostic indicators. *Risk to self* (high vs. low) refers to the stated potential for losing one's job or jeopardizing one's career. *Risk to society* (high vs. low) refers to the potential harm to society if the unethical organizational behavior is actually occurring. Eighty participants were asked to access as much information as they wanted, and to make a decision about what to do.

We looked at the effects of the independent variables from two perspectives: process and outcome. Process was explored by examining patterns of information gathering

through analyses of cue boxes opened. We found that people opened more ambiguity cue boxes when ambiguity was high than when it was low. Contrary to hypotheses, more risk-to-society cue boxes were accessed when risk to society was low than when it was high. Outcomes were examined through measurement of participants' willingness to report the alleged behavior to the appropriate authorities. Participants were more willing to report the purported ethical breach when risk to self was low, or when risk to society was high. A significant risk-to-self by risk-to-society interaction suggested that low risk to self particularly enhanced participant willingness to report incidents when risk to society was high. The ambiguity of cues and information had no effect on likelihood of reporting - people were equally willing to report whether or not they could be reasonably sure that the unethical behavior was actually occurring.

Results of this study suggest that individuals will respond to complex situations by a) trying to be more sure of the situation, particularly with respect to potential dangers to society, b) making trade-offs that reflect a recognition and analysis of competing risks; and c) focusing on risks to others over those to themselves. Ultimately, risk to society was the most heavily weighted cue. An interesting facet of the results was that none of the variables impacted the total amount of information accessed, suggesting that the coherence and completeness of information processing is not a direct function of risk or ambiguity. Two counter-intuitive results deserve more discussion. Intriguing and contrary to our hypotheses were the findings that people accessed more information concerning the risk to society when the scenario presented it as low rather than high, and the finding that ambiguity level did not impact people's willingness to report the organization. It seemed that when initial information indicated that risk to society was high, it created a threshold of unacceptable risk that guided decisions, regardless of the risk to self or the level of certainty that the behavior was actually occurring. When risk to society was initially presented as low, however, participants needed to assure themselves that risk to others was really not an issue before making a decision. Implications of these findings extend to other situations in which people seek out information to manage risks and make decisions. (Note: Please contact me if you're interested in more info! K.)

The Blackstone-Ratio Project: Evaluation of Juror Thresholds for Guilt

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We have been working at Kansas State University (KSU) on a collaborative project with Len Dalgleish at the University of Stirling. In 1769, Judge Blackstone argued that "it is better that ten guilty persons should escape, than that one innocent should suffer." This 10:1 ratio defines the criterion for deciding between "guilty"

and "not guilty" in a trial, much in the same way that Signal Detection Theory (SDT) defines the threshold between signal and noise. The Blackstone Ratio (BR) can also be seen as an extension of Hammond's "irreducible uncertainty" in the duality of inevitable errors.

To estimate the empirical value of BR, two studies were conducted at KSU. In the first study, 36 students in a Forensic Psychology course were asked to assess the criterion of guilt for a murder case. The BR values varied between 0:1 (N = 19) and 100:1 (N = 1), with a modal value of 1:1 (N = 9). For Blackstone's original ratio of 10:1, N = 2. The wide variation suggests that many Ss may not understand the tradeoff between wrongful acquittals and wrongful convictions. Also, the context of a murder trial may have misled Ss.

Therefore, in the second study, 34 Forensic Psychology students were asked about their prior beliefs without reference to a specific case. The BR values ranged from 0:1 (N = 10) up to 500:1 (N = 1), with modal values between 2:1 and 10:1 (N = 10). N = 6 for Blackstone's original ratio of 10:1 to 25:1. The wide range of results suggests that, despite the simplified task, direct elicitation of BR values may still be quite difficult for many Ss.

There are three implications of these results. First, the large number of Ss who have a BR of 0:1 means they are unwilling to make a tradeoff, i.e., they do not want any truly guilty to go free, even at the cost of many wrongful convictions. Second, Blackstone argued that (by a ratio of 10:1) the greater error is a wrongful conviction; however, 21% of Ss were in the opposite direction – they were more concerned about wrong acquittals. Finally, the wide range of BR values suggests that the greatest source of disagreement in a jury trial may be the threshold for guilt – as opposed to the degree of guilt.

Ongoing research at KSU is now examining BR values for three definitions of guilt ("Clear and Convincing Evidence", "Preponderance of the Evidence" and "Beyond Reasonable Doubt") for three types of crimes (murder, rape, and burglary). Preliminary results suggest systematic variations in BR values as a function of both definition of guilt and type of crime.

Representative Design and Sampling

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Egon Brunswik's request for representative design raises the question about what is going to be represented and how to go about sampling the ecology to be described and make inferences about. This complex is discussed by Hammond (1996, pp. 68-70) and Björkman (1969, p. 146). Hammond introduces the distinction between formal situational sampling (content being ignored) and substantive situational sampling, referring to representativeness over content. Björkman suggests the concept representativeness being substituted by the concept "ecological relevance". All these three aspects of the sampling problem deserve the utmost attention as they may broaden the generalizability of research results. By developing Brunswik's theory and conceptual world in all these three aspects, it will be possible to apply his theory and conceptual world to new research areas. Our present three studies are confined to sampling over

content combined with a request for ecological relevance.

1. How does psychiatric diagnosis function?

The main functions of psychiatric diagnosis are according to Kutz, Garb & Kuritsky (1983).

a) explanatory in etiological terms, ideally in mutually exclusive categories
b) guiding choice of best treatment
c) predicting future development, prognostic within limits
d) facilitating professional communication
e) screening off, once diagnosed, less need to communicate with the patient

Modern categorial manuals like DSM IV are discussed and shortcomings exemplified from case-studies. Validity criteria for categorial diagnoses are usually of a coherence character, for example, other manuals or some expert consensus. Even old slogans like "diagnosis and treatment have been in accordance with experience and science" have often been used as the only criteria in discussions about single cases. Very seldom have correspondence criteria been sought in the patient's ecology, in the patient's real world, Popper's World 1. What we find, when checking a number of patient charts against patients' first person accounts, is an amazing ignorance among clinicians about the importance of taking idiographic, contextual information into consideration when making inferences and attributing the patient. On the bases of patient's first person accounts a category system, describing false inferences mainly depending on this neglect, is presented. Correspondence criteria are suggested to be searched for in the patient's ecology.

2. Representative design

This study deals with sampling of cue senders in hospital wards and is restricted, by an interview instruction, to the psychosocial need aspect in nursing situations. In a critical incident interview, 172 nurses answered the following question: How did you first become aware of the problem (situation) you just have described? The answers were categorized by two independently working analysers according to a category system including 20 different categories of cue-senders, like doctors, relatives, fellow patients, occupational therapists, etc. The reported 350 incidents were classified with regard to work-context by the informants. Number of cue-sender categories varied from 10 to 1 across work-context. The average number of cue-checks per reported case, within context category, varied from 2.02 to 1. The variation among incidents reported in this study, with regard to content, work-context and spontaneously reported cue-senders, should be taken into account when judging the representativeness of task-descriptions in decision research as well as in developing teaching material for training social skills in nursing.

3. Cognitive feedback and representative task description

Different feedback concepts are presented and described. A forestry operation, "short wood logging" consisting of 17 sequential subtasks, requiring psycho-motor skills combined with decision making, has been selected to demonstrate how a work analysis can be used to plan the application of feedback principles, when arranging training sites, simulating a naturalistic complex ecology (forestry ecology). To grade the tolerance for non-optimal performance across the 17 subtasks, 140 forestry teachers rated the

subtasks in the following five goal-aspects:

1. quality demands
2. safety demands
3. planning demands
4. health demands
5. quantity demands

For each of these demands the 17 subtasks were rated with regard to self-evaluation versus the student's need for cognitive feedback, a pedagogical aspect. The relations between the goal aspects and the pedagogical aspects are presented as rank correlations. From these relations, subtasks could be identified, which were critical both in the goal-aspect and the corresponding pedagogical aspect.

This forestry example demonstrates one way to sample situations (subtasks) helping us to preserve the naturally existing, causal texture of the ecology, when arranging simulated teaching and training situations to facilitate the application of feedback principles. These results were used in planning, at forestry schools, training sites for simulating certain critical subtasks representative for a forestry worker's naturalistic ecology.

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Effects of Base Rate, Values, and Feedback on Accuracy and Performance in Decision Making

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We have continued our investigation of how people learn to make decisions when feedback is limited because the decision itself eliminates the possibility of feedback. Since last year's meeting we have consulted extensively with Len Dalgleish who has also been working on this problem.

Our attention has been focused on a finding from our research and other studies that when people only receive outcome feedback when they make positive decisions, they tend to

make fewer positive decisions and more negative decisions than when they receive complete feedback. We want to understand the conditions under which this occurs and the reasons for it. Explanations involve hypotheses about what subjects are learning on the trials where they don't receive feedback. Elwin et al. (2007) demonstrate how this result might occur if people assumed that their negative decisions were always correct. Len Dalgliesh and Luke Smillie have proposed a related hypothesis involving "internal feedback." Other models have proposed various mechanisms for trial by trial and threshold adjustments based on feedback, but they have always assumed complete feedback. It may be possible to adapt these models to the situation where no feedback is given when the decisions are negative.

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Elwin, E., Juslin, P., Olsson, H., & Enkvist, T. (2007). Constructivist Coding: Learning From Selective Feedback. *Psychological Science, 18*(2), 105-110.

Modelling Professional Judgment Using the Matching Heuristic

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I am a graduate student working in the area of judgment and decision making under the supervision of Dr Mandeep Dhami at the University of Cambridge. In particular, I am interested in professional decision making. We recently presented three studies that aimed to capture professionals' decision policies in three domains: physicians' decisions to refer patients to psychological counselling; psychiatrists' assessments of the risk of violent offending; and prison managers' disciplinary decisions in staff misconduct hearings. These professionals' decision strategies were modelled using the Matching Heuristic (MH; see Dhami & Ayton, 2001). The findings of all three studies suggest that professionals indeed use heuristic strategies when making their decisions. Across all three domains, professionals used few of the available cues to make their decisions. In addition to the descriptive fit of the MH shown in Study 1, its predictive fit was demonstrated in Study 2 (via cross-validation), and in Study 3 it was shown that both the judge and environment can be captured using the MH. It is important to study professional decision making because such decisions can have significant ramifications for individuals, organizations, and society.

Reference:
Dhami, M. K., & Ayton, P. (2001). Bailing and jailing the fast and frugal way. *Journal of Behavioral Decision Making, 14,* 141-168.

News from Elise Weaver

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I have just begun a new position as a research scientist at the Human Resources Research Organization, a contract research organization that specializes in projects that improve human performance. I am currently involved in projects that pertain to soldiers' choices to stay or leave the army after their first term, personality and behavior in leaders, and student motivation in educational assessment.

Previously, I spent a year at the Corporate Executive Board, where they facilitate the sharing of management best practices across a network of executives who occupy the same function at Fortune 500 organizations and government agencies. I was involved in researching best practices for implementing project portfolio management decision support software in organizations. The interesting question from a research perspective was: What is the appropriate match between an organizational culture and software functionality?

Modestly Brunswikian Work

Weiss, David J.
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Having subversively attended Brunswik meetings for several years now, I have found myself drawn to ideas that I have gleaned from the sessions. These ideas are now infiltrating my work on performance assessment. At the 2007 meeting, I will report my response to a question Alex Kirlik raised at the 2004 meeting, namely why do error penalization schemes either explicitly or implicitly incorporate squaring discrepancies from a standard, while the ecology of the “real world” does not incorporate this feature. Note that regression-based algorithms such as the Lens Model include squaring. The non-laboratory world either punishes errors linearly or imposes a threshold for correctness; to my knowledge, large errors are rarely, if ever, punished extremely. I applied several performance indices to the same data set (students doing intuitive arithmetic). In practice, squaring errors as opposed to using absolute deviations made little difference in the rank orders of the expertise attributed to the students.

Len Dalgleish has been fiddling (with me as his second fiddle) with the CWS index of expertise that Jim Shanteau and I have been promulgating for the past few years. What I think of as Len’s Lens Model places CWS within an elaborated context that illustrates how the researcher’s assumptions regarding what is known constrain what the data

can tell us about performance. This understanding forces us to look hard at the plausibility of those assumptions. For example, are ratings made by a supervisor really a gold standard? Although I am not too keen on viewing CWS as someone's special case, this integration of ideas reinforces the value of interactive scientific meetings.

Just to maintain my status as heretic, I also want to let you know that Jie Weiss and I have edited "A Science of Decision Making: The Legacy of Ward Edwards", soon to be released by Oxford University Press.

Representative Design in Modern Quantitative Research in Educational Psychology

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Following the principal ideas concerning Representative Design (Brunswik, 1956). Bernhard Wolf proposes an example of modern, empirical (quantitative) idiographic approach (utilizing Representative Design) in Educational Psychology in the following draft:

Wolf, B. (2007). *Single case findings using Representative Design. Submitted* (not yet accepted) to the International Journal of Idiographic Science.

If you are interested in this draft: *wolf@uni-landau.de*

Announcement and Invitation

"Original Brunswik"

International Conference on the works of Egon Brunswik
(1903-1955 / Budapest – Wien – Berkeley)

July 16-17, 2008
D-76829 Landau in der Pfalz (Germany)

- Homepage: www.originalbrunswik.org
- Submission of abstracts (70 words) of papers: as soon as possible (wolf@uni-landau.de)
- Deadline for papers and registration: April 30, 2008
- Language of the meeting: English
- Registration fee: 30 Euro (in cash during the conference)
- Only papers with a clear connection with the original ideas of Brunswik will be considered

Organizer
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Purpose of the conference

- Psychologists grappling with the question of how an organism copes with its environment should give greater weight to the authentic psychological work of Egon Brunswik, because some often overlooked parts of his unique approach are relevant.
- Some of his important ideas taken from his 48 publications (theoretical, methodological, experimental, practical) will be presented at Landau in July 2008.
- The main focus will be on papers which examine the connections between (a) fundamental principles of the original work of Brunswik and (b) modern psychological research focussing particularly on processes such as decision, judgment or choice related to actions.

Topics ("Cues") and rules for papers

Suggestions for topics as well as rules for papers can be found on the official website for this meeting www.originalbrunswik.org or requested from Professor Dr. Bernhard Wolf (wolf@uni-landau.de)

The submitted paper may either deal only with "original Brunswik" or combine aspects of (a) Brunswik's ideas (developed between 1927 and 1955) with (b) modern psychological research. But at all events the focus of the paper must be on "original Brunswik".

A list of Brunswik's original works as well as other pertinent literature and full details about this meeting can be found on www.originalbrunswik.org.

Scientific support by

- Brunswik Society (http://www.brunswik.org)
- Prof. Dr. Kenneth R. Hammond, Emeritus of the University of Colorado at Boulder
- Center for Adaptive Behavior and Cognition (Director: Prof. Dr. Gerd Gigerenzer) at the Max Planck Institute for Human Development in Berlin
- University of Landau, Departments of Psychology and Education

Lodging and conference venue:

Park-Hotel
Mahla Str. 1
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www.parkhotel-landau.de

Note that this meeting in Landau takes place just three days before the

29th International Congress of Psychology (ICP) July 20-25, 2008 in Berlin (Germany)

23rd Annual International Meeting of the Brunswik Society

15-16 November 2007

Barcelona/Casablanca Rms, Westin Long Beach[1], Long Beach, CA

AGENDA

Thursday 15 November 2007

Time	Activity
12.00-13.00	Late Registration
13.00-13.15	**Welcome and Introduction from Program Committee**
13.15	**Paper Session 1: Research Innovations I (Chair: Len Dalgleish)**
13.15-13.45	*More on learning to make judgment and decisions in an uncertain world* (Stewart, T., Mumpower, J., & Holzworth, J.)
13.45-14.15	*How does feedback format affect multiple-cue judgment?* (Thorsten, P., & Olsson, H.)
14.15-14.45	*Probability matching reconsidered* (Gaissmaier, W., & Schooler, L. J.)
14.45-15.00	**Tea/Coffee Break**
15.00	**Paper Session 2: Theory and Method (Chair: Jason Beckstead)**
15.00-15.30	*Determinants of linear judgment: A meta-analysis of lens model studies* (Karelaia, N., & Hogarth, R.)
15.30-16.00	*A critical meta-analytic perspective of the components of the lens model equation in judgment achievement* (Kaufmann, E., Sjödahl, L., Athanasou, J.A., & Wittmann, W.W.)
16.00-16.30	*Social judgment theory and social sciences: Are they compatible?* (Carvalho, M.)
16.30-17.00	*An empirical investigation of error penalization schemes* (Weiss, D.J., & Brennan, K.)
17.00	**End of Day One**
19.00	**Group Dinner at King's Fish House (sign up on the day)**

[1] 333 East Ocean Boulevard, Tel: +1 + 562 436 3000

Friday 16 November 2007

Time	Activity
8.30-9.00	Continental Breakfast
9.00	**Panel Discussion: Correspondence-Coherence (Chair: Jim Holzworth)**
9.00-9.20	*Origin of the coherence-correspondence distinction* (Dawson, N.)
9.20-9.40	*Are coherence-correspondence needed in judgment and decision making?* (Dunwoody, P.)
9.40-10.00	*Coherence and correspondence in medical decision making: Ubiquitous but unnoticed* (Tape, T.)
10.00-10.20	*Coherence and correspondence in engineering design* (Katsikopoulos, K.)
10.20-10.40	**Tea/Coffee Break**
10.40-11.00	*Searching for coherence in a correspondence world* (Mosier, K.)
11.00-11.20	*Commentary on correspondence-coherence presentations* (Hammond, K.)
11.20-12.00	Questions/comments from audience
12.00-13.15	**Buffet Lunch**
13.15	**Paper Session 3: Research Applications (Chair: Tom Tape)**
13.15-13.45	*Correspondence and coherence theory: Cognition and individual differences in supply chain inventory planning in the newsvendor problem* (Moritz, B.)
13.45-14.15	*Qualitative analyses of decision and judgment processes in a field study of complex dynamic decision making* (Omodei, M., McLennan, J., Funke, J., Wearing, A.J.)
14.15-14.45	*Using judgment analysis to reduce antibiotic prescribing in acute respiratory tract infections* (Wigton, R.S., Darr, C.A., Corbett, K.K., Nickol, D.R., & Gonzales, R.)
14.45-15.00	**Tea/Coffee Break**

15.00 **Paper Session 4: Research Innovations II (Chair: Jeryl Mumpower)**

15.00-15.30 *Comparison of three methods for analyzing multiplicative data* (Shanteau, J.)

15.30-16.00 *What is the ecological niche of take-the-best?*
(Marewski, J.N., Schooler, L.J., & Gaissmaier, W.)

16.00-16.30 *Evidence-based expertise: A theoretical framework and some data*
(Dalgleish, L., & Weiss, D.)

16.30-16.45 **Hammond-Brunswik New Investigator Award presented by Ken Hammond**

16.45-17.00 **2007 Meeting Adjourned and Farewell by Program Committee**

See also:
http://www.brunswik.org/annualmeetings/agenda2007.pdf

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