

THE BRUNSWIK SOCIETY NEWSLETTER

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ABOUT

The Brunswik Society is an informal association of researchers who are interested in understanding and improving human judgment and decision making. Members of the Society share an appreciation of the work of the psychologist Egon Brunswik.

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Visit the Brunswik Society website at <http://www.brunswik.org/>.

To receive information about the Society's annual meeting and newsletter, email BrunswikSociety@gmail.com.

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Kaufmann, E., Molinaro, K.A., & Salmen, K.

TABLE OF CONTENTS

Foreword

Adaryukov, J., Collsiö, A., Hamm, R. M., Kaufmann, E., Molinaro, K.A., & Salmen, K.	5
--	---

Agenda

27 th International (Virtual) Meeting of the Brunswick Society	7
---	---

Contributions

<i>Barsalou, L. W.</i> Brunswikian Themes in Grounded Cognition	11
<i>Beck, J., Dutke, S., & Utesch, T.</i> Using Brunswik's Lens Model to Identify and Reduce Teacher Biases in the Informal Assessment of Student Motivation	14
<i>Bhowmik, C.V., Schrader, F., Back, M.D., & Steffen, N.</i> An Application of Brunswik's Lens Model to the Educational Context	18
<i>Brauer, K. & Proyer, R.T.</i> Using Lens Model Analyses for the Study of Accurate Judgments on Dispositions Toward Ridicule and Being Laughed at	21
<i>Csaszar, F.A.</i> Using Brunswik's Lens Model to Theorize About the Optimal Complexity of Representations	24
<i>Davidsson, P.</i> External Enablement of Entrepreneurial Action and Success	27
<i>Fiedler, K. & Salmen, K.</i> Brunswik's Lens Model and Distributive Memory Representations: A Notable Case of Theoretical Pre-Adaptation	30
<i>Grüning, D.J. & Salmen, K.</i> Metacognition as Monitoring and Control of the Cognition-Environment Fit: A Lens Model Perspective	33

<i>Holleman, G.A.</i> A PhD Candidate’s Tribute to Egon Brunswik and Kenneth Hammond	36
<i>Koch, A. & Woitzel, J.</i> Individual Differences in Cues to the Favorability of Groups	39
<i>Lunn, P.D. & Somerville, J.</i> How Accurately Can People Resolve Trade-offs?	42
<i>MacCoun, R.J.</i> Blinding Data in Science and Society: A Lens Model Framework	43
<i>Nastase, S.A.</i> Toward a More Ecological Cognitive Neuroscience	46
<i>Phan, L. V. & Rauthmann, J.F.</i> Examining Wisdom Using a Nomological Lens Model Network	49
<i>Richter, B.</i> Viewing Attitude Research Through a Brunswikian Lens	52
<i>Weiss, D.J. & Shanteau, J.</i> Is There Anyone We Haven’t Offended? Brunswikian Researchers, Join the Club	55

Book Review

<i>Doherty, M.E., Stewart, T.R., Holzworth, R.J.</i> “Noise” and Social Judgment Theory: A Commentary on Kahneman, Sibony, and Sunstein	56
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FOREWORD

We are very pleased to present the 2021 Brunswik Society Newsletter.

This year in the pandemic there has been plenty of research published that uses the Brunswikian framework and the lens model methodology. Hence, we are preparing for our second remote online Brunswik Society meeting, which will be held Thursday and Friday December 9th and 10th, 12.00-14.00 EST (17.00-19.00 GMT) each day (see details below).

In the current newsletter, two teams of long-time researchers in this area, all retired, have special commentaries on the current state of our broad judgment field and its recognition or neglect of the Brunswikian framework (relating models of the world to models of people's judgments about the world to understand judgment accuracy). We invited David Weiss and Jim Shanteau to expand on their views of the Brunswikian program and method, since they had mentioned Hammond's (1996) book and the Cognitive Continuum Theory (Hammond, Hamm, Grassia, & Pearson, 1987) in their recent paper (Weiss & Shanteau, 2021) that argued that much of JDM research has had little effect because the focus has been model testing rather than usefulness. They provided brief comments but encourage us to read the paper for the full scope of their assessment of reasons for JDM's lack of impact on the broader world. While they see a glass half empty, there have been attempts to fill it, such as the many analyses of judgments of representative real-world cases, as well as linkages between other JDM approaches and field studies (e.g., List, 2021). From a somewhat complementary perspective, Mike Doherty, Jim Holzworth, and Tom Stewart show how many of the problems and ideas presented in Kahneman, Sibony, and Sunstein's new book "Noise", have been addressed over the past six decades by Brunswikian researchers, using a different and seemingly more useful and productive vocabulary. We welcome these thoughtful contributions.

In a similar vein, Le Phan and John Rauthmann observe how different subfields of researchers have trouble communicating due to independently developing their own vocabularies, producing jingle (different words for same concepts) and jangle (same words applied to different concepts). Samuel Nastase provides an example, showing that the field of human neurosciences uses "ecological validity" where we'd say "representativeness," as John Kihlstrom described in his contribution to last year's newsletter.

Welcome to all new and returning contributors. Also note that our editorial team this year includes new members. We hope the richness of this newsletter and the up-coming Brunswik Society meeting will inspire Brunswik-Hammond research and the critical discussion on it.

Thank you to Tom Stewart, the webmaster of the Brunswik Society, for providing web access to the newsletter.

Sincerely,

James Adaryukov, August Collsiöö, Robert M. Hamm, Esther Kaufmann, Kylie A. Molinaro, and Karolin Salmen

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AGENDA

27th International (Virtual) Meeting of the Brunswik Society

Free event – register your name, affiliation, and email address with esther.kaufmann@gmx.ch

DAY 1 PROGRAM

9th December 2021, 12.00-14.00 EST (17.00-19.00 GMT) via Zoom

Theme – Brunswik-Hammond Inspired Insights and Reflections

Opening remarks – Mandeep Dhani (Middlesex University, London, UK) & Esther Kaufmann (University of Konstanz, GER)

Title: The Lens Model's C Parameter Reflects Idiosyncratic Influences on Metamemory Judgments

Authors: Monika Undorf, Sofia Navarro-Báez, & Arndt Bröder (University of Mannheim, GER)

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Abstract: Applying Brunswik's (1952) lens model to people's predictions of their own future memory performance (judgments of learning, JOLs) revealed that the C parameter was much higher than in standard lens model analysis. We propose that this is due to C reflecting idiosyncratic influences on metamemory and memory such as the personal significance of stimuli. The two experiments reported here tested this hypothesis. We made randomly chosen items personally significant in Experiment 1 and assessed the personal significance of items in Experiment 2. Personal significance increased metamemory judgments and memory performance. Including personal significance as a predictor in the lens model reduced C , whereas including previous encounters with the items in the experiment did not. Hence, the lens model's C parameter captures idiosyncratic influences on metamemory.

Title: Applying Social Judgment Theory to Understand What Peer-Reviewers Pay Attention to When Evaluating Proposals

Authors: Gaëlle Vallée-Tourangeau (Kingston University London, UK), Ana Wheelock (Imperial College London, UK), Tushna Vandrevalla (Kingston University London, UK), & Priscilla Harries (Kingston University London, UK)

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Abstract: While research has revealed inconsistencies and lack of agreement in peer-reviewers' evaluations of grant proposals (Pier et al., 2018), the reasons remain unclear. Informed by Social Judgment Theory (SJT, Hammond, 1977), we view reviewers' recommendations as resulting from the application of a professional "judgement policy." We sought to infer what research quality factors expert reviewers pay attention to while reviewing a funding proposal in a semi-naturalistic setting. We recorded think-aloud protocols from 7 reviewers, and identified 56 quality criteria,

organised around 5 areas. Next, 28 expert reviewers ranked the criteria in order of importance. Contrary to earlier findings, we uncovered ten quality factors which were consistently rated as most important for assessing the quality of a fellowship application. We discuss the implications, and what is involved in meta-research studies.

Title: Using Cognitive Continuum Theory to Explore the Role of Peer-Interaction in Social Work Sense-Making

Author: Duncan Helm (University of Stirling, UK)

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Abstract: Social workers are routinely required to make complex, subjective judgements under conditions of chronic uncertainty. Their decisions can have a profound impact on the lives of the people who use their services. Cognitive Continuum Theory (Hammond 1996, 2000) would indicate that social work judgments are frequently quasi-rational; oscillation on the cognitive continuum being induced by the properties of the decision-making task. This paper draws on Hammond's theory as a framework for exploring the operation of quasi-rationality in social work practice through peer-interaction. Based on a limited, but growing, number of naturalistic studies and a review of multiple literatures, I propose a model of peer-aided judgement in social work practice. Key elements of the model are considered, and strengths, limitations and potential applications are indicated.

Discussion Paper: Is There Anyone We Haven't Offended? Brunswikians, Join the Club

Authors: David J. Weiss (California State University, US) & James Shanteau (Kansas State University, US)

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Abstract: We recently published a paper whose title, "The futility of decision making research", conveys its sad conclusion. The primary theme is that in order to make model testing feasible, JDM researchers followed Ward Edwards's strategy of using toy problems that were poor analogs to the important decisions they purported to study. Pertinent to this group is our prediction is that, like the Functional Measurement tradition in which we were raised, most Brunswikian research is headed to the dustbin of history, having chosen the model to be the message. What will survive, we think, is the notion of representative design, whose import is that it forces the researcher to focus on the task. Indeed, the Futility paper could be read as a plea for representative design.

Discussion paper available here: <https://doi.org/10.1016/j.shpsa.2021.08.018>.

Discussants: Jeryl Mumpower (Texas A&M University, US) & Gary McClelland (University of Colorado, US)

Closing remarks – Gijs A. Holleman (Utrecht University, NL)

DAY 2 PROGRAM

10th December 2021, 12.00-14.00 EST (17.00-19.00 GMT) via Zoom

Theme – Environmental Cues and «Noise»

Opening remarks – Karolin Salmen (Heidelberg University, GER)

Title: What Makes a Good Quality Indicator Set? A Systematic Review of Criteria

Authors: Iris Blotenberg, Laura Schang, & Dennis Boywitt (Institut für Qualitätssicherung und Transparenz im Gesundheitswesen, GER)

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Abstract: Health care quality indicators serve to enable their users – such as patients, providers and policy-makers – to make informed decisions based on the quality of care. While single indicators measure specific aspects of quality (e.g., timely support during labour), users of these measures are frequently interested in some broader construct (e.g., quality of community-based maternity care). However, while there are criteria for the quality of single indicators, guidance on desirable properties of indicator sets is lacking. To address this gap, the Brunswick lens model provides a helpful starting point: Accordingly, indicators serve as “cues” forming the “lens” through which users of measurement results “view” the targeted construct. If the “cues” do not represent the construct in a valid fashion, conclusions about the construct may be misguided.

Title: Proximal and Distal Beliefs

Authors: Joseph Sommer, Pernille Hemmer, & Julien Musolino (Rutgers University, US)

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Abstract: Multiple psychological theories of belief have proposed that people possess two separate kinds of beliefs. Both intuitive (Sperber, 1997) or testable (Abelson, 1986) beliefs guide behavior and are updated by new evidence, while reflective (Sperber) or distal (Abelson) beliefs are relatively inert and immune to evidence. E.g., the belief that it is raining is readily updated, while political ideologies are not. In contrast to this apparent qualitative difference, we introduce a distinction between proximal and distal beliefs based on how their evidential cues are presented by the environment. Drawing on Brunswick’s notion of probabilistic functionalism and the philosophy of science, we propose that beliefs of all types are best understood as attempts to integrate noisy cues to arrive at an accurate approximation of the world.

Title: Perceiving a Pandemic: Global-local Incompatibility and COVID-19 Superspreading Events.

Authors: Stephen Broomell (Carnegie Mellon University, US) & Patrick Kane (McGill University, CA)

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Abstract: Brunswick’s lens model approach focuses on judgments in the context of the environment. We present a decision environment represented by infection rates at different levels and explore their impact on risk judgments. The primary mode of infection driving the COVID-19 pandemic are superspreading events, but their effect on risk judgments is unknown. We theorize that superspreading diseases create a large variance in infections across geographic localities, leading to highly variable and inaccurate risk perceptions. We test our predictions using a simulation study and a U.S. representative sample study, and find that localized county-level

infection rates explain a significant proportion of variance in judgments of national infection rates, contributing to judgment errors. This highlights the importance of studying the environment in studying risk perception.

Discussion Paper: “Noise” and Social Judgment Theory: A Commentary on Kahneman, Sibony and Sunstein

Authors: Michael E. Doherty (Bowling Green State University, US), Thomas R. Stewart (University at Albany, US), & R. James Holzworth (University of Connecticut, US)

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Abstract: *Noise: A flaw in human judgment* by Kahneman, Sibony, and Sunstein (hereafter, KSS) addresses problems that have been the focus of Brunswikian research and Social Judgment Theory (SJT) since 1955. We describe the approach that SJT has taken to problems that KSS describe. In a spirit of cooperation, we explore noise from the perspective of SJT and indicate possible relations to their prescriptive ideas. Our concern with inconsistency of judgment (KSS: occasion noise) and disagreement among experts (KSS: noise) spans nearly seven decades and countless published works. We not only recognize the existence and importance of noise, in the sense that KSS use it, SJT researchers have made extensive use of methods for studying it and addressing the problem in applied settings. Discussion paper available in the *Contributions* section of the newsletter.

Discussant: Robert M. Hamm (University of Oklahoma Health Sciences Center, US)

Closing remarks – James A. Athanasou (University of Sydney, AUS)

Social/Networking Hour!!!

10th December 2021, starts 14.15 EST (19.15 GMT)

Free event – invites will be sent to meeting delegates

CONTRIBUTIONS

Brunswikian Themes in Grounded Cognition

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Brunswikians may find sympathetic views and proposals in the interdisciplinary research area of grounded cognition (Barsalou, 2010), also known as embodied cognition (Coello & Fischer, 2016a, b; Varela, Thompson, & Rosch, 2016) and 4E cognition (Newen, Bruin, & Gallagher, 2018). This brief note references several recent articles related to Brunswikian themes.

The importance of the environment constitutes one connection between Brunswik and grounded cognition. Within grounded cognition, the perspective of situated cognition has argued for decades that adequate understandings of cognition, affect, and action only develop from studying them coupled with physical and social environments (Aydede & Robbins, 2009; Barsalou, 2010, 2020). Consistent with cautionary notes in the Brunswikian and Gibsonian traditions, adopting a decontextualized abstractionist approach is likely to yield limited and potentially erroneous conclusions. It is essential to study cognition, affect, and action in the specific situations where they occur (also addressing important roles of embodiment and the modalities).

Barsalou (2020) proposed that the situated action cycle offers a useful framework for understanding how cognition, affect, and action mediate between the environment and behavioral outcomes. In situations central to human activity, the situated action cycle supports the pursuit of important goals and personal meaning. Repeated runs of the situated action cycle condition habits via situational memories that dominate control of future behavior (also see Barsalou, 2016a, b). Over time, situation-specific conditioning increasingly controls perception, cognition, affect, and action in similar situations.

Generalizability offers a second connection between Brunswik and grounded cognition. Both traditions question whether mechanisms established in decontextualized laboratory paradigms will generalize to real-world environments. To generalize mechanisms, it is essential to study cognition, affect, and behavior in the situations where they occur.

In the Brunswikian spirit, Barsalou (2019) explores issues associated with generalizing from idealized laboratory paradigms to real-world situations, drawing implications for the current replication crisis (also see Miller et al., 2019). Assessing real-world situations and bringing them into the laboratory increases the chances that laboratory findings will generalize. The Situated Assessment Method offers one approach for capturing the content of real-world situations (Dutriaux, Clark, Papiés, Scheepers, & Barsalou, 2021). The Situated Assessment Method can also be viewed as a tool for capturing the environment's correlational structure, another shared theme with Brunswik.

Probabilism offers a third connection between Brunswik and grounded cognition. Two forms of probabilism are potentially relevant: situation probabilism and mechanism probabilism. Situation probabilism results from sampling past situational memories to control situated action in the current situation (Barsalou, 2016a, b, 2020). For each individual, a unique population of situational memories accumulates over their lifetime from runs of the situated action cycle (offering a natural account of individual differences). In the current situation, a small subset of these memories is sampled probabilistically to control cognition, affect, and action. As a consequence of activating different situational memories, differences emerge in how individuals respond to the same environmental cues, and in how the same individual responds across occasions.

Mechanism probabilism reflects the assumption that the brain does not contain a set of rigid mechanisms. Instead every mechanism is inherently probabilistic, taking infinite forms across different situations. Barsalou (2019, 2020) develops the construct of a quantum mechanism. From this perspective, the form of a mechanism established in an idealized laboratory paradigm is likely to differ from its form in real-world situations. More generally, the mechanism takes varying forms as different situations modulate its expression.

Variance in a mechanism's form offers a natural account of the replication crisis. Rather than there simply being a crisis that reflects inability to replicate the same rigid mechanism across situations, the mechanism is often taking different forms in different situations, often as a function of moderator variables in the environment (poor scientific practices no doubt contribute to variability as well). To understand a mechanism means to understand the diverse forms it takes, together with properties of the associated situations that induce them.

Predictive cues offer a fourth connection between Brunswik and grounded cognition. In grounded cognition, the construct of representation takes the form of multimodal simulation, not the amodal symbols of classic cognition (Barsalou, 1999, 2008). As people perform the situated action cycle in specific situations, memory systems capture the states of perceptual, motor, and affective systems for future predictive use. On later occasions, these memories are reenacted in a multimodal manner to simulate and represent anticipated states of the world not yet present. As Barsalou (2009) reviews, these anticipatory states offer a powerful form of predictive inference that supports diverse forms of intelligent activity (also see Barsalou, 2016a, b). Although this approach differs from predictive cues in the Brunswik Lens model, the two approaches capture complementary aspects of the prediction process with potential to be combined effectively.

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Using Brunswik's Lens Model to Identify and Reduce Teacher Biases in the Informal Assessment of Student Motivation

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In educational sciences, it is well-known that teachers are rather good in judging their students' performance informally (e.g., $r = .63$, Südkamp et al., 2012). However, teachers often judge other people's cognitive-emotional characteristics less accurately than their learning performance and competence. For example, students' motivation is judged with an accuracy ranging between $.14 < r < .41$ (Dicke et al., 2012; Givvin et al., 2001). These differences presumably occur due to (1) performance involving more directly observable behavior compared to motivation (Reeve & Nix, 1997), (2) more prior knowledge of valid indicators of learning performance, and (3) more salient stereotypes regarding motivation than regarding learning performance (Hinnermann et al., 2018). Especially the use of stereotypes may be linked to low knowledge about motivation and subsequent uncertainty in judging student motivation. For example, Kaiser et al. (2013) showed that misleading information, like students' academic achievement, is used when judging student interest. Others found that teachers rely on students' gender, ethnicity, and social background when forming a judgment on motivation (Bonfeld et al., 2020; Holder & Kessels, 2017; Tobisch & Dresel, 2017). However, these studies did not examine teacher judgments in a unified model including many possible indicators teachers could rely on. Including these cues in a single model allows a comparison of their relative influence. Brunswik's (1956) lens model can help to describe teachers' use of different cues holistically. Importantly, the degree to which students associate these cues with motivation can be revealed. Further, such a model allows a comparison between cue validity (i.e., students' understanding of motivation) and cue utilization (i.e., teachers' use of cues). If the cues in the judgment model are weighed according to their validities, teachers' judgments may be regarded as structurally equivalent to the students' understanding of motivation. In line with this reasoning, we hypothesize that teachers base their informal assessment of student motivation on different cues than students do in assessing their own motivation. Furthermore, teachers probably make use of distracting variables like gender and ethnicity that are not associated to students' motivation.

For the doctoral thesis of the first author, we conceptualized two studies. In the first study, we will investigate whether the teachers' judgments of student motivation can be represented precisely in a lens model. Since motivation is a not directly observable variable, judges are assumed to infer observable cues that underly motivation (see Back, 2021). Research has yet only scarcely identified behavioral patterns that are associated with motivation (Katz et al., 2008). Thus, we will test whether teachers use theoretical dimensions of motivation (learning goals, performance-approach goals, performance-avoidance goals, and work avoidance) to form a judgment of students' motivation. Therefore, students at secondary schools will be asked how motivated they are in current class. Additionally, their goal orientations will be measured with the *scales for the assessment of learning and achievement motivation* (Spinath et al., 2012). The teachers of these classes will judge their students' current motivation with a single item (see Zhu

& Urhahne, 2014). Goal orientations, students' gender, ethnicity, and grades in German and mathematics will serve as observable cues whereas students' current motivation in class will serve as criterion value. Teacher judgments will serve as participant response. The lens model will be calculated across all participating teachers and students to increase the generalizability of the results. Cue utilization and response linearity will exhibit how reliably teachers base their judgments of student motivation on the students' goal orientations (Elliot & Dweck, 1988). Further, residual correlation provides information about whether teachers and students relied on cues missing in the model (see Karelaia & Hogarth, 2008).

If the lens model represents teacher judgments appropriately, we aim to reduce teacher biases by providing feedback in a second study. In general, feedback appears to be an effective strategy to learn cue probabilities. According to the lens model, multiple cue probability learning (Brehmer, 1972, 1979; Hursch et al., 1964) is an appropriate approach. For example, Newell et al. (2009) showed that people are able to learn the probabilities of a limited number of cue combinations so that subsequent judgments were improved. The learning effect was greater when feedback contained probabilities that were relevant for judging compared to mere outcome feedback. However, probability feedback was effective for binary judgments and a small number of possible cue combinations. Students' motivation, however, is judged on a continuous scale with a nearly infinite set of possible cue combinations. Furthermore, it is not clear to what extent teachers are able to identify students' goal orientations. Therefore, there is the need to investigate whether providing feedback about cue validities and cue utilization in judging student motivation (1) can be integrated in teachers' knowledge, (2) reduces subsequent biases, and (3) improves the alignment of student motivation and teacher judgment. We propose that two processes are relevant when applying this knowledge, (1) integration of feedback into the knowledge of the judging person, and (2) cognitive strategies when using this knowledge in a judgment task (Hammond & Summers, 1972). To provide feedback to teachers, they receive a visualization of the lens model. This visualization will present the cues on which teachers base their judgments on (i.e., cue utilization). Furthermore, teachers will receive information about cue validities and thus, information about the theoretical construct of motivation (cf. Thiede et al., 2018). Teachers then are requested to identify cues which they (mis-)used. Afterwards, they will be tested about this new knowledge to assess feedback integration. Subsequently, we will ask the participating teachers to reflect the possible reasons of their judgment biases and develop cognitive strategies that enable them to reduce their biases.

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An Application of Brunswik's Lens Model to the Educational Context

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Interpersonal judgments are prevalent in most daily interactions between individuals and therefore also concern the educational context. We suggest that the knowledge about the nature of interpersonal perception and judgment, obtained from the large body of research applying Brunswikian theory and methods, can and should be transferred to the school and teaching context to better understand teacher-student interactions and the role of teacher judgments for students' educational outcomes.

Forming judgments about students, for example regarding their motivation and abilities, is an everyday task of teachers. These initial impressions can have a large impact on various instructional decisions and subsequent judgments across months or years during which a teacher is responsible for a certain student. Those judgments, in turn, can have an impact on students' academic achievements and prospects later in life (e.g., Alvidrez & Weinstein, 1999; Förster et al., in press). Whereas individual teachers seem to differ substantially in their ability to accurately perceive students' characteristics (Machts et al., 2016; Südkamp et al., 2012). To date, little is known about possible factors that drive these differences and the processes that result in more or less accurate judgments.

Based on Brunswik's lens model, our research aims at identifying behavioral and physical cues that perceivers utilize for their judgment of students' academic self-concept, motivation and intelligence based on brief, nonverbal videos of students they are unacquainted with (i.e., zero-acquaintance approach, see Ambady et al., 1995). Another goal is to identify cues that are reliable and valid for the actual student characteristics (see Figure 1). In our study, two groups of judges (teachers and psychology students in the following subsumed as teachers; $N = 102$) therefore provided ratings of students' ($N = 45$) academic self-concept, motivation and intelligence based on brief nonverbal video clips. Two independent raters extracted numerous behavioral cues from the videos. These cues were subsequently aggregated to 17 cue aggregates that were then used in a lens model parameter analysis.

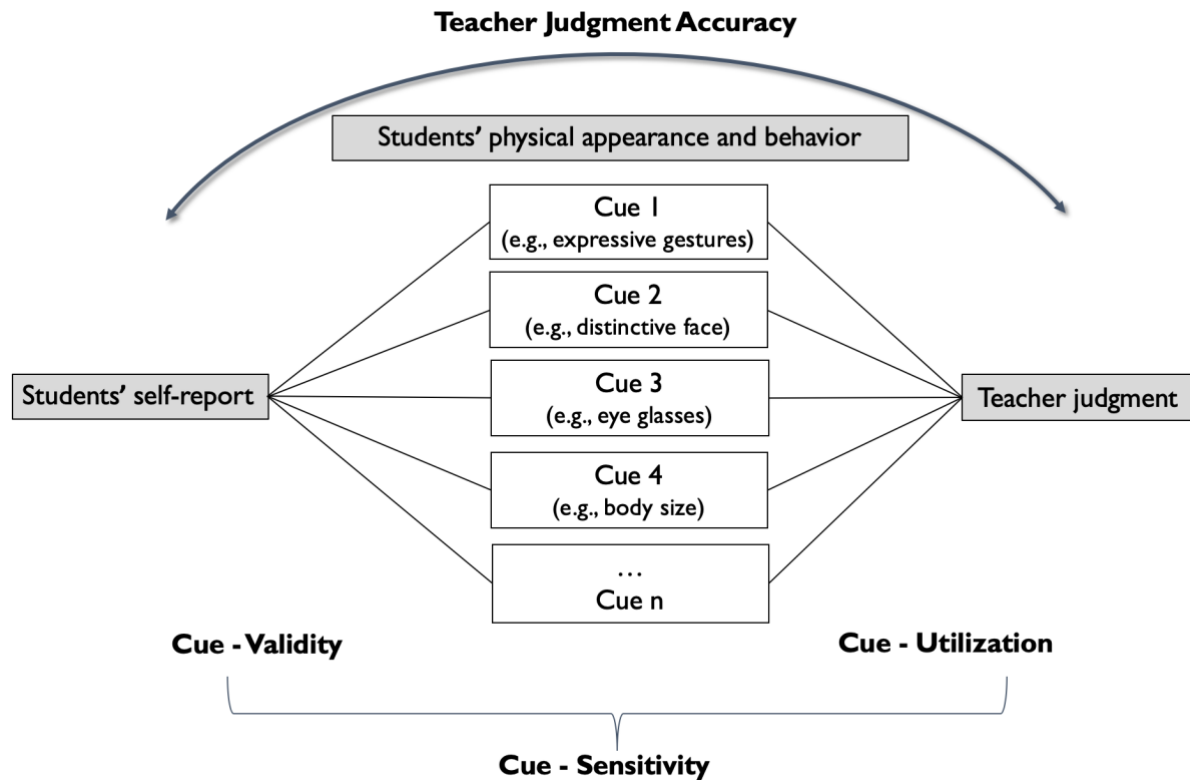


Figure 1. Diagram of a lens model to describe teacher judgments. Adapted from “Applications and Extensions of the Lens Model to Understand Interpersonal Judgments at Zero Acquaintance” by S. Nestler und M. D. Back, 2013, *Current Directions in Psychological Science*, 22(5), p. 375. (Nestler & Back, 2013).

Preliminary analyses showed that judgment accuracy varied substantially between constructs. Highest accuracy values were found for the judgments of students’ intrinsic motivation ($r = .23$). This was also the construct with the strongest predictability ($R^2 = .61$) and cue-sensitivity ($r = .37$). The results also indicate that students’ sex had the largest validity and that perceivers were relying on students’ sex as the most important cue for their judgments across all constructs.

The design of the present study was inspired by the large existing body of research employing a thin-slice of behavior approach in personality and social psychology, using brief videos of targets as the basis for perceiver judgments (Ambady & Rosenthal, 1992; Back & Nestler, 2016; Carney et al., 2007; Murphy et al., 2015). Using a zero-acquaintance and thin-slice of behavior approach, we aimed at capturing some principal features of first impression formation that translate to realistic situations in which teachers are confronted with previously unknown students for the first time.

The lens model has not been used to its full potential to explain differences in judgment accuracy among teachers, but our results show that the model bears a large potential to further our knowledge of teacher judgmental processes and outcomes.

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Using Lens Model Analyses for the Study of Accurate Judgments on Dispositions Toward Ridicule and Being Laughed at

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Gelotophobia (fear of being laughed at; Greek: *gelos* = laughter), gelotophilia (joy in being laughed at), and katagelasticism (joy in laughing at others) are individual differences variables at the trait-level describing how people deal with ridicule and being laughed at (Ruch & Proyer, 2008, 2009). There is robust evidence that dealing with laughter plays a role in social relationships; for example, in romantic relationships, in student-teacher interactions in school, and at work—to name but a few (e.g., Barabadi et al., 2021; Brauer & Proyer, 2018; Ruch & Stahlmann, 2020). We aimed at studying the accuracy of perceptions of the three laughter-related dispositions from short textual self-descriptions and used Brunswick’s (1956) lens model to examine the role of linguistic cues for accurate judgments at zero-acquaintance (Brauer & Proyer, 2020).

Across two studies we asked participants ($N = 218$ and 132 ; *target sample*) to write a short self-description (up to five sentences) and provide self-ratings in the standard measure for the assessment of the laughter-related dispositions, the PhoPhiKat-45 (Ruch & Proyer, 2009). Next, two independent samples of 10 judges read the targets’ self-descriptions and provided their impressions of how each target deals with ridicule and being laughed at by completing an abbreviated 9-item form of the PhoPhiKat (Hofmann et al., 2017) in the third-person (e.g., “When strangers laugh in his/her presence, he/she often refers it to himself/herself”). The accuracy correlations were above chance in both studies; namely, .40 (gelotophobia), .35 (gelotophilia), and .29 (katagelasticism; $ps < .001$) across the two studies. Thus, how people deal with ridicule and being laughed at can be accurately perceived above chance from short self-descriptions.

Next, we examined the role of linguistic cues with the lens model. First, we analyzed the self-descriptions with the *Linguistic Inquiry and Word Count* (LIWC; Pennebaker et al., 2007) software that scans the texts regarding about 80 pre-defined language categories (e.g., grammatical, psychological, and social categories) and added the search terms as “laugh/laughter¹,” “humor,” “joke,” “sarcasm/cynicism,” and “irony.” The LIWC gives the relative frequencies of the word usage for each of the categories, and we used the word usage as cues that might relate to the targets’ dispositions (cue-validity) and judges’ impressions of the dispositions (cue-utilization). To estimate the cue-validity we correlated the LIWC frequencies for each category with targets’ self-ratings in the PhoPhiKat-45 whereas the cue-utilization was computed by correlating the LIWC frequencies with the judge ratings. The findings widely met the expectations. For example, gelotophobia related negatively with using “laugh/laughter” ($r_{\text{validity}} = -.16$) and this was correctly utilized by the judges ($r_{\text{utilization}} = -.31$). This was also true for gelotophilia ($r_{\text{validity}} = .12$, $r_{\text{utilization}} = .47$; $ps < .025$), while katagelasticism was unrelated from

¹The noun “laughter” and verb “laugh” are the same in German (“Lachen”).

using the laughter cue in self-descriptions. More importantly, we were interested in the sensitivity, that is the overall overlap between the cue-validity and cue utilization vectors across all linguistic cues (i.e., LIWC categories). We computed the vector correlations between the validity and utilization coefficients for each disposition separately and found average sensitivity coefficients of .43 (gelotophobia), .41 (gelotophilia), and .22 (katagelasticism; all $ps < .001$) across studies.

Our findings extend the knowledge on the interpersonal perception of dealing with ridicule and being laughed at by showing that the dispositions can be accurately perceived from textual self-descriptions. Further, using the lens model (Brunswick, 1956) allowed us to examine the role of linguistic cues. In line with the expectations, the dispositions were differently expressed in the language use and judges seem to utilize cues correctly (i.e., correctly using valid cues and rejecting invalid cues) for each disposition. Also, there is robust overlap between the validity and utilization of linguistic cues when judges derive impressions on how people deal with ridicule and being laughed at from short textual self-descriptions.

Our study is, hopefully, a fruitful starting point for further research in this area. For example, future research might test whether *judges'* own level of gelotophobia, gelotophilia, and katagelasticism relate to their ability to accurately identify cues and derive inferences about targets' expressions in the laughter-related dispositions (Letzring, 2008). A limitation of the LIWC approach is that only count data are provided without broader acknowledgment of the content of the self-descriptions. Extension to natural language use and alternative analysis methods is desirable to overcome such limitations in future studies.

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Using Brunswik's Lens Model to Theorize About the Optimal Complexity of Representations

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Here I present a brief summary of the paper “A contingency theory of representational complexity in organizations” by Csaszar and Ostler (2020) published in *Organization Science*. This paper starts by pointing out that there are competing views regarding how complex the representations used by organizations should be (e.g., their models, rules, and procedures). On the one hand, some researchers find that simple representations are superior (e.g., Gigerenzer & Goldstein, 1996, on heuristics and Bingham & Eisenhardt, 2011, on “simple rules”). Other the other hand, other researchers suggest that more complex representations are better (e.g., Weick 1979 suggests that firms should “complexify” in order to perform better than their competitors). In between these two views, there is Ashby's (1956) law of requisite variety, which implies that representations should be as complex as the environment. How should we decide among these competing views?

The paper by Csaszar and Ostler answers this question by developing a mathematical model based on Brunswik's lens model. In the paper's model, one can control the complexity of the environment (i.e., the left-hand side of Brunswik's model) and then see whether simple or complex representations perform better in that environment. The environment and the representation are modeled as multilinear polynomials (e.g., $y = 2x_1 + 3x_2 + 4x_1x_2$). The complexity of the environment and the representation (denoted K and K' , respectively) depend on the number of main effects and interactions (e.g., $y = x_1 + x_2 + x_1x_2$ is more complex than $y = x_1 + x_2$).

Apart from the complexity of the environment and the representation, the model also incorporates three other relevant contingencies: the uncertainty of the environment (modeled as a random error term in the environment's polynomial), how much data or “experience” was available to create the representation (modeled as the number of prior observations used to infer the representation via OLS regression), and whether the representation is created in an “informed” way (i.e., whether one knows which are the most important cues to include in the regression).

Simulating the model under a large number of conditions and looking at its average behavior produces the patterns shown in Figure 1. Interestingly, this figure shows that whether a representation should be simple or complex depends in nuanced ways on the different contingencies. For example, under the situations described in panel (b), it is better to use complex representations (performance is maximized when K' , in the x -axis, is highest). In contrast, under the situations described in panel (c), it is better to use simple representations (performance is maximized with low levels of K'). Moreover, in panel (d), the optimal representational complexity is to be as complex as the environment (i.e., performance is maximized when $K' = K$). The mechanism that explains these results is the trade-off between bias and variance (Geman et al., 1992).

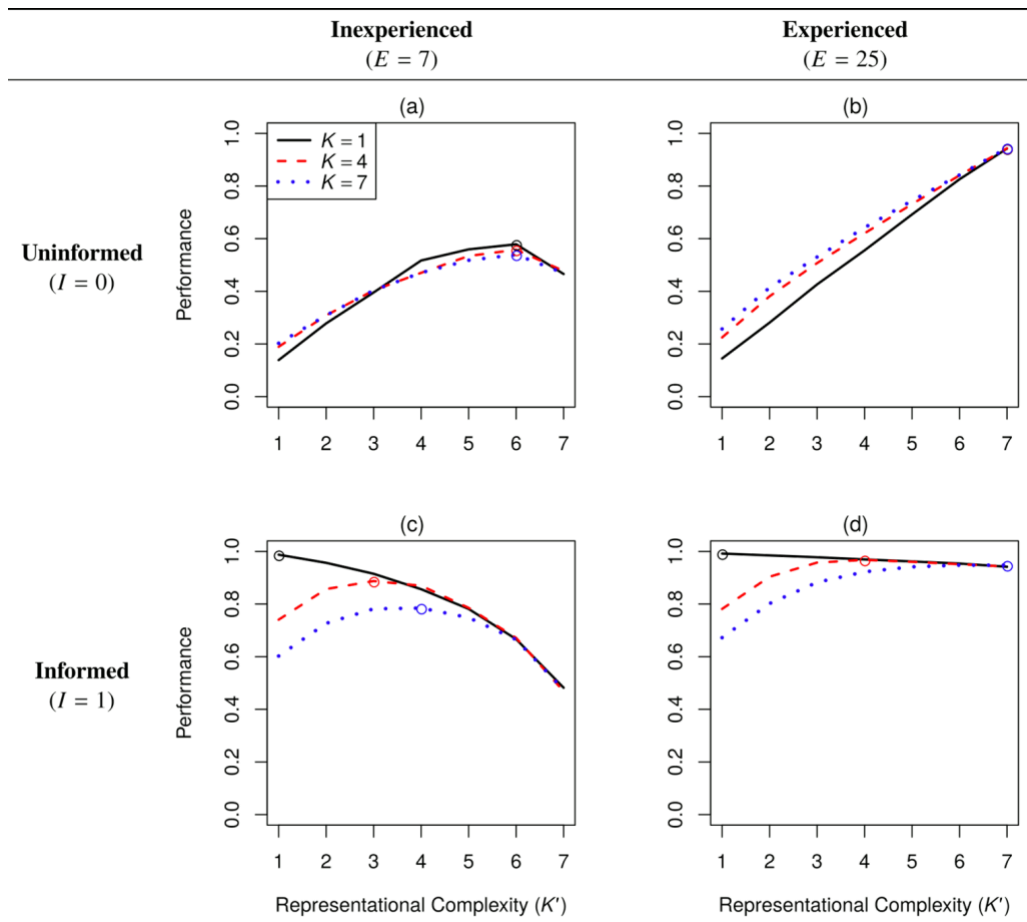


Figure 1. Performance as a function of representational complexity (K' , on the x-axes), environmental complexity (K , as curves), experience (E , as columns), and informedness (I , as rows) from Csaszar, F. A., & Ostler, J. (2020). A contingency theory of representational complexity in organizations. *Organization Science*, 31(5), 1198–1219.

The paper delineates the conditions under which it is better to use simple versus complex representations. In doing so, the paper provides a coherent framework that integrates previous conflicting results on which type of representation is better. The paper also shows that the relative advantage of heuristics vis-à-vis more complex representations critically depends on an unstated assumption of “informedness”: that one can know what are the most relevant variables to pay attention to. When this assumption does not hold, more complex representations are usually better than simpler ones.

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External Enablement of Entrepreneurial Action and Success

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One of Egon Brunswik's main tenets was that psychology should pay as much attention to the properties of the organism's environment as it does to the organism itself. This is the spirit in which the External Enabler (EE) concept and framework were created. They were coined and developed within entrepreneurship studies as an alternative to the unproductive notion of "objective opportunity" (Davidsson, 2015) and more broadly to address the neglect of environmental changes as a causal force in business scholarship of recent decades (Davidsson, 2020). The EE framework (Davidsson et al., 2020a) aims to supplement the many agent-focused theories on individual-, group- and organizational levels that are used in these fields with conceptualizations that capture important variance in the external reality these agents encounter.

EE refers to significant changes to the business environment, such as new technologies, regulatory changes, macroeconomic shifts, demographic and sociocultural trends, changes to the natural environment, etc. Kimjeon & Davidsson's (2021) review of past research on entrepreneurship in response to environmental changes found that this literature is characterized by limited volume; separation by type of change and being scattered across disciplines and publications; accumulation of knowledge being hampered by lack of shared conceptualizations; typically focusing on one environmental change at a time, and frequently connecting the change to an effect on the business start-up rate without explicit links to the psychological and strategic micro-level processes that produce this outcome. Therefore, the EE framework (Davidsson et al., 2020) seeks to inspire more and different research in this area. In particular, it aims to encourage research that generalizes across types of change; explores interactions and interdependencies among EEs, and links macro and micro (environment and agent) as per Coleman's (1990) bathtub model. It does so by providing a common structure and terminology for the enabling influence of environmental change that is applicable across different types of change.

The premise of the EE framework is that any nontrivial change to the business environment disequilibrates some parts of the economic system and therefore favors *some* new business activities, whether or not the total effect on the economy is positive. This safe and historically supported assumption makes it possible to identify an EE before there is evidence of entrepreneurial action and success in response to it. Importantly, the perspective taken is not that of established businesses but that of the not-yet-existing ventures that might strategically or fortuitously exploit the new potentials that have emerged as a result of the change. This choice of perspective explains and justifies the unbalanced focus on the enabling side of change, because new ventures do not flock around environmental changes that are detrimental to their creation.

Within and across EE types, the EE framework draws attention to variance and commonality in the spatial, sectoral, sociodemographic and temporal *scope* of EEs as well as in the suddenness and predictability of their *onset*. These types of variance are important because they likely

influence the *kind* and *magnitude* of entrepreneurial responses to an EE as well as *where*, *by whom*, and with *what level of success* such responses occur. On the level of individual ventures, the EE Framework details a range of *mechanisms* that help improve *supply*, *demand* or *value appropriation*. What mechanisms an EE can provide, for what type of venture, and at what stage of the venture development process are issues of interest to both entrepreneurs and policy makers (cf. von Briel et al., 2018). Of strategic interest is also variance in two *characteristics of EE mechanisms*, namely *opacity* and *agency-intensity*. Opacity refers to the extent to which creative ingenuity and/or specialized knowledge is required to identify a particular mechanism. Agency-intensity denotes how time- and resource-demanding the activation of a mechanism would be. Increased market demand due to favorable weather exemplifies low opacity and agency-intensity, whereas the opposite likely applies to developing a reliable and cost-effective application of a brand-new technology.

Also on the venture level, EE mechanisms pertain to one or more *EE roles*. Roles denote non-exclusive functions during the venture creation process. Specifically, the EE can *trigger* the process. It can also *shape* the product/service, the venture (e.g., its business model) and/or the venture creation process itself. Lastly, the EE can *enhance outcomes* of various kinds compared to what would have been possible without the EE.

The EE framework is currently gaining currency within and possibly beyond entrepreneurship studies. For applications to different types of EE, see Bennett (2019), Chalmers et al. (2021), Chen et al. (2020), Davidsson et al. (2021), Klyver & Nielsen (2021), and von Briel et al. (2018). Davidsson (2020b) offers some ideas on psychological research on EEs.

As stated in the opening, the EE framework is related to Egon Brunswik's work by adhering to the notion that psychology should give as much attention to the properties of the organism's environment as it does to the organism itself. In particular, the distinction between triggering and outcome-enhancement highlights that would-be entrepreneurs cannot perfectly predict what "amount" of enablement an external enabler can provide through what mechanisms, and this is attributable both to the EE (opacity) and the agent (knowledge, creativity, etc.). This produces a discrepancy between the cues that drive action and what drives success. To the extent that such biases are systematic—that entrepreneurship hopefuls consistently over-react to some EE cues and pay insufficient attention to others—the EE framework offers a key to uncovering what might be the most important insights to share in entrepreneurship education. Pre-dating the EE framework, Grégoire & Shepherd's (2012) study of opacity (structural vs. superficial alignment of supply- and demand-related stimuli) provides inspiration for psychological research towards such aims.

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Brunswick's Lens Model and Distributive Memory Representations: A Notable Case of Theoretical Pre-Adaptation

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Undoubtedly, Brunswick's (1955) probabilistic functionalism was ahead of the dominant behaviorist methodology of his time. Even now, eight decades later, the lens model (Brunswick, 1952) continues to be a forward-looking trendsetter, as this note aims to illustrate. The central notion that we cannot directly perceive distal concepts, such as danger, risk, or honesty, but infer or construe them from vectors of proximal cues that are only probabilistically related to these distal concepts, strikes us as foundational for modern psychological theorizing. The importance and impact of this notion are most striking for contemporary connectionist models of memory and cognition.

To illustrate, consider the vector of cues that constitute a lens to infer the distal concept of honesty. Let the ideal vector of cues that signal honesty be: gaze +, no hesitations –, detail +; deep voice +, no pupil dilatation –, no nervousness –, no adapters –. Thus, a cue vector of (+, –, +, +, –, –, –) ideally indicates honesty. Yet, even noisy copies of a vector pattern in which a few elements are reversed (sampling error) or missing (vicarious functioning) are sufficient to “perceive” honesty. An aggregate (sum of “+” minus “–” observations per cue) of $k=2$, $k=4$, $k=8$, ... or $k=16$ observations from noisy vectors (e.g., each with two randomly selected elements reversed) bears increasingly strong correlations with the honesty ideal, as shown in simulation studies (Fiedler, 1996; Hintzman, 1988; McClelland & Rumelhart, 1985).

This lens-model representation of honesty as a cue vector corresponds to the distributive memory representation used in modern connectionist modeling and artificial intelligence (Fiedler, 1996; Hintzman, 1988; McClelland & Rumelhart, 1985). One can consider these approaches an extension and formalization of Brunswick's probabilistic functionalism. They offer disarming, straightforward explanations for various psychological phenomena without any further parametric assumptions. Connectionist modeling shows, for instance, that the correlation between the honesty ideal and an aggregate of observations increases with the number of observations k . In the example above, $k=16$ produces an almost perfect correlation with the ideal honesty pattern despite noise, thus accounting for mere-exposure effects.

Similarly, aggregation over distributive vector patterns also affords a parsimonious account of many other phenomena, such as illusory correlations, confirmation bias, better-than-average effects, accentuation effects, or typical intergroup biases (Dougherty, Gettys & Ogden, 1999; Fiedler, 1996). For instance, granting that positive and norm-abiding (honest) behavior is more frequent than negative and norm-deviant (dishonest) behavior, the dominant positivity trend is more apparent when sample size (for an ingroup or majority) is large than when sample size is

small (for an outgroup or minority). No further assumptions (or model parameters) are required to explain the genesis of these important phenomena.

Distributive vector models can account for cognitive biases related to sample size, which were the focus of several previous papers (Dougherty et al., 1999; Fiedler, 1996; Smith, 1991). They also open novel perspectives on so far neglected semiotic origins of stereotyping and illusory correlations, which rely on the intensional similarity of the vector patterns used to construct different distal entities. For instance, assume that there are as many great and dismal leaders among extroverted and introverted persons (extraversion and leadership ability are extensionally uncorrelated). Nevertheless, the cue patterns that signify extraversion may share some cues with the cue patterns that signify leadership ability (cue overlap, Fiedler et al., 2008). This principle is easily illustrated with the item overlap of two questionnaires used to assess extraversion and leadership. In the presence of such cue overlap, every observation of extraverted behavior will partially resemble an exhibition of good leadership. Vice versa, bad leadership may be taken as an indicator of introversion if overlapping cues are present. Consequently, an aggregate vector pattern will mimic a positive correlation. It needs to be emphasized that this can happen even if no correlation between the distal constructs exists extensionally and the perceiver is fully unbiased otherwise. In the current example, we will observe biased judgments of extraversion and leadership ability simply because their imperfect, cue-based perception relies on overlapping cue patterns.

To illustrate and elaborate on this point, Table 1 compares the cue pattern for honesty mentioned above with cue patterns for two other distal entities, namely, arousal and familiarity, and a base rate cue pattern that signifies average behavior. Please note that it does not matter if the pattern similarities built into this example are correct; they only serve here to explain the semiotic approach. Assuming that the cue pattern of arousal is dissimilar (negatively correlated) to the honesty pattern, a plausible hypothesis lets us anticipate a negative (illusory) correlation; affective arousal should induce a feeling of dishonesty, even when the extensional correlation is zero or maybe negative. Meanwhile, familiarity should be positively related to honesty inferences. Consistent with the notion that positive behavior (like honesty) is normative and frequent (Unkelbach, Alves, & Koch, 2019), the conformist behavior in the rightmost “base rate” column should lead to perceived honesty.

Table 1. Intuitive ideal patterns of various distal entities trigger illusory correlations.

Cue	Honesty	Arousal	Familiarity	Base Rate
Gaze	+	?	+	+
Hesitations	–	+	–	–
Detailedness	+	–	?	?
Deep voice	+	?	+	?
Pupil dilatation	–	+	–	–
Nervousness	–	+	–	–
Adapters	–	+	–	?

Thus, the semiotic approach we are suggesting offers a natural way to study judgments of manifold distal constructs. Nevertheless, cue overlap as a mechanism has been largely neglected in previous research (for a couple of notable exceptions, see Fiedler, Freytag & Bluemke, 2008; Salmen, Haasova, Florack & Fiedler, 2021). Even scholarship that adopts a probabilistic functionalism approach rarely appraises the relationship of several distal constructs and their perceptual lenses. Taking up such a perspective in future research may cause a shift from intrapsychic and ecological determinants of stereotyping and cognitive biases to a semiotic analysis of the proximal cues that mediate inferences and constructions of distal entities. We believe that such a semiotic approach to judgment and decision-making is not only grounded in the lens model, but also promises to meaningfully extend this framework in the future.

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Metacognition as Monitoring and Control of the Cognition-Environment Fit: A Lens Model Perspective

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Metacognition consists of two processes, monitoring (i.e., accurately representing one's own mental state and the external environment) and control (i.e., controlling one's cognition and the environment), that play a vital role in self-regulated adaptation (Grainger et al., 2016). However, the metacognitive process of monitoring and control has never been connected to the distal nature of the environment and a person's own mental states. Inspired by Brunswik's (1952) lens model, we introduce a novel model that construes this dual-part adaptation process as probabilistic, cue-based, and circular.

Metacognition monitors not just the environment for informative cues but also the person's cognition and bodily states. Examples of such intrapersonal cues are familiarity (e.g., Metcalfe et al., 1993), mood (e.g., Soldat et al., 1997; Schwarz & Bless, 2020), fluency (e.g., Unkelbach, 2006; Wänke & Hansen, 2015), or ceiling height (e.g., Meyers-Levy & Zhu, 2007). As shown in Figure 1 (blue area), which follows Brunswik's (1952) lens model, every environmental and intrapersonal cue possesses imperfect ecological validity and varies in its utilization by the person. Ecological validity means the cue's actual diagnosticity for the momentary state of the cognition-environment fit. Cue utilization describes how much the cue influences a person's judgment. Subjective cue utilization is based on individual learning and experience and may differ substantially from objective validity (Brunswik, 1952; Brehmer & Joyce, 1988; Fiedler, 1996). The probabilistic judgment of cognition-environment fit also entails an uncertainty estimate. Particularly if the stakes of the cognitive task are high and the context calls for high metacognitive precision, this model predicts that individuals should seek further cues.

Suppose a cognition-environment fit is judged as lower than desired at an acceptable level of certainty. In that case, a person can exert control through cognitive regulation and external action within the environment (Figure 1, green area). For instance, a chess player may increase their likelihood of winning by assessing their opponent's strategy and adjusting their own (i.e., mental changes), or by choosing opponents whose strategy matches their own skills and preferences (i.e., environmental changes). Here, the insights from the monitored cues serve an important additional function to determine the success likelihood of possible control strategies (e.g., cognitive restructuring or behavioral distancing). Importantly, we propose that this process of screening cues and using them for informed control of environment and cognition is repeated until the person experiences a satisfactory cognition-environment fit.

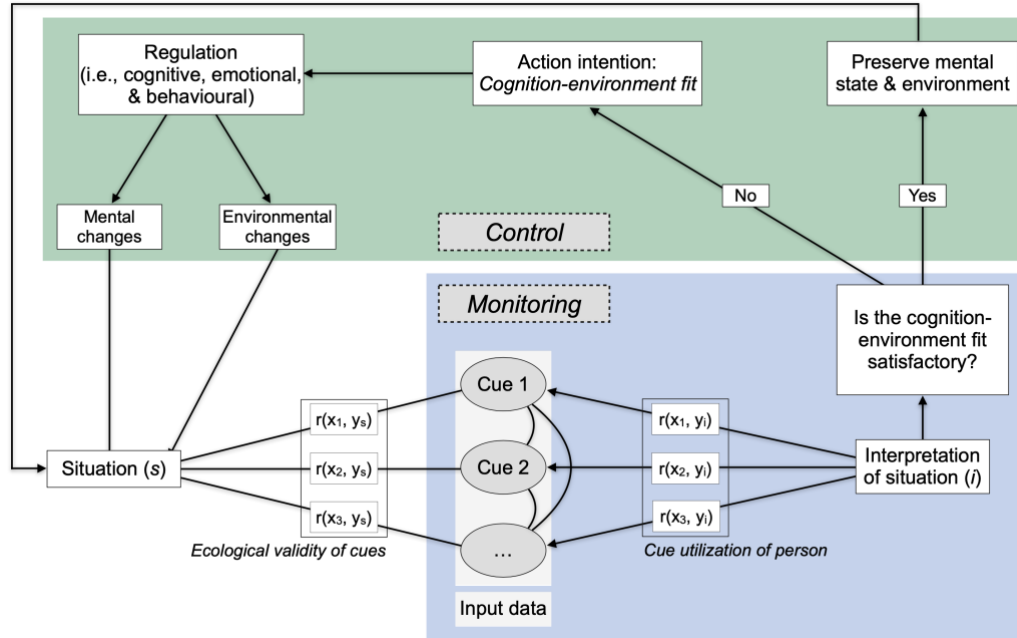


Figure 1. Model of metacognition as cue-based monitoring and control of cognition-environment fit.

With this approach, we aim to describe people’s adaptation to diverse environments and explain different levels of adaptational success. Reaching an environment-cognition fit depends heavily on the diagnosticity of available cues and the suitability of their utilization that stems from prior learning experiences. Put shortly, successful metacognition depends not only on the decision maker’s capacities but also on the difficulty of the environment. A similar point was put forward for decision-making (Hogarth et al., 2015). *Kind environments* provide feedback that is swift, accurate, and inexpensive. The environment of the current decision matches well with the environment the decision-maker is familiar with. Hence, learned feedback is a valuable source to inform action. In *wicked environments*, prior feedback is substantially less diagnostic (Hogarth, 2001). Our model extends this characterization with probabilistic functionalism. It models how a “wicked” environment impairs metacognition and thus truthful judgments and successful decisions through impoverished environmental cues. Prominent examples are the stock market or start-up businesses. These domains harbor a multitude of variables which are opaque, intertwined, and subject to changes across time. Further, the areas show high volatility and provide feedback (e.g., investment profits) with a time delay.

Within this text, we can only provide a short overview of the proposed model. In the future, we aim to provide a formalization of cue-based monitoring and control of the environment and mental states. This step, first and foremost, calls for characterizing every process within the model by a clearly defined array of possible inputs and outputs, and the direction of effect. Simultaneously, we review existing literature for relevant metacognitive cues and evaluate their importance and occurrence in different external and internal environments. If any such cue examples occur to the reader of this short note, we would be delighted to hear about them.

Metacognition is the individual’s key tool to navigate diverse and changing environments. We propose that this adaptation can be characterized by a probabilistic, cue-based, and repetitive process of monitoring cues in the external and internal world to inform control within these

domains. Successful metacognition means to perceive and achieve a fit between environment and cognition.

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A PhD Candidate's Tribute to Egon Brunswik and Kenneth Hammond

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This year, I finished my doctoral thesis entitled ‘Social attention in the real world: Theoretical and empirical limits’ (Holleman, 2021), which I will defend on Friday the 3rd of December 2021. In my thesis, the ideas of both Egon Brunswik and Kenneth Hammond about ‘representative design’ and ‘ecological validity’ feature prominently, as I weigh in on a recent ‘real world or the lab’-discussion in the field of social attention (see Holleman et al., 2020a, 2021). To counter the notion that ‘more’ or ‘greater’ ecological validity in experimental, lab-based research warrants generalizability of results to the ‘real world’, I revived Hammond’s critique (1998) that references and statements about ‘ecological validity’ and the ‘real world’ often remain undefined, and therefore, “do not responsibly offer a frame of reference for the generalization”.



Figure 1. This portrait of Egon Brunswik was drawn by my sister Roos Holleman, who was kind enough to make a series of drawings to accompany the different chapters of my doctoral thesis.

I have argued that many so-called ‘real world’ studies of social attention show that gaze behavior to other people may vary substantially across different social situations. Thus, there is no such thing as ‘real world’ social attention. In my view, to develop a more sophisticated account of ‘social attention’ phenomena, researchers first need to specify the social context of human

‘social attention’ phenomena, researchers first need to specify the social context of human interaction in which they are interested (i.e., a ‘theory of the environment,’ Barker, 1966). I proposed that this will be a more constructive way to understand gaze behavior and social attention as a function of different social contexts, and thereby uncover the context-generic and context-specific aspects of social attention at large.

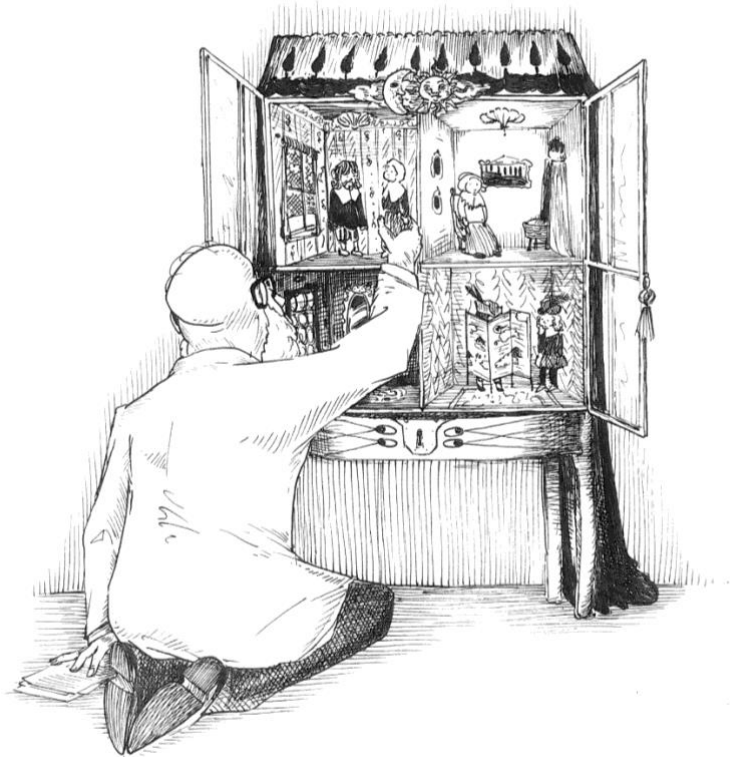


Figure 2. A scientist and his dollhouse by Roos Holleman.

I was pleased to see that my work on these topics has received many positive comments from other researchers and has also sparked an interesting response article by Kihlstrom (2021). This tells me that Brunswik’s and Hammond’s ideas remain highly relevant today. Also, I was very happy to be invited last year to present my work for the Brunswick Society meeting in 2020. I really enjoyed the thoughtful discussions and diversity of the work presented there, and this experience was definitively a highlight of my time as a PhD candidate.



Figure 3. ‘Probabilistic face-to-face interaction’ by Roos Holleman (based on Holleman et al., 2020b).

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Individual Differences in Cues to the Favorability of Groups

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People join groups for various reasons – to feel that they belong, achieve great things because unity makes strength etc. (Abele et al., 2021; Koch et al., 2021). However, membership in some groups only brings trouble. Thus, people want to know the favorability of their current groups and alternatives. Unfortunately, flawless judgment of groups' favorability is what dreams are made of. To put it in terms of Brunswik's (1952) lens model, people must rely on proximal, manifest cues to judge the distal, latent truth of groups' favorability, and they will make more errors than they prefer because cues are noisy. So what cues do people use?

In large, society-representative samples of groups, two cues have priority in the sense that people use them spontaneously (Koch, Speckmann et al., 2020). First, the groups' socioeconomic status (power, status, wealth etc.), and second, their ideological beliefs ranging from conservative (traditional, conservative etc.) to progressive (modern, liberal etc.). According to relatively recent research (Koch, Imhoff et al., 2016), people judge as favorable those groups whose status and beliefs are moderate. In contrast, they see groups with extreme status or beliefs as a no-go (Imhoff & Koch, 2017; Koch & Imhoff, 2018), consistent with research in other domains showing that all sorts of extremes are negative (Alves et al., 2017; Koch, Alves et al., 2016; Unkelbach et al., 2019; 2020).

This research follows Brunswik's (1955) call for representative design. Because it aims to generalize to how individuals judge the favorability of all sorts of groups, it examines large, society-representative samples of groups. The research falls short of representative design, however, because it shows how groups' status and beliefs predict averaged favorability ratings. What is the problem? Well, averaged ratings are not representative of everyone's judgments, which differ a lot. A recent series of papers does a better job at representative design by clarifying how individuals differ in judging the favorability of all sorts of groups.

It turns out that people favor those groups whose beliefs are similar to the beliefs of the self. This, which is also known as homophily by ideology, means that conservative people favor and trust conservative groups more than progressive groups. Moderates favor and trust moderate groups more than both conservative and progressive groups. And progressive people favor and trust progressive groups more than conservative groups. Homophily by ideology replicates when people judge the favorability of all sorts of societal, occupational, as well as regional groups (Imhoff et al., 2018; Koch, Imhoff et al., 2020; Koch et al., 2018). And it replicates when they put their money where their mouth is by behaving cooperatively towards ideologically similar groups (Koch, Dorrough, et al., 2020).

Further, new research shows that homophily by ideology is asymmetric. The beliefs of the self are more important to people with extreme compared to moderate beliefs. Thus, conservatives and progressives show stronger homophily by ideology than moderates. In terms of the lens model (Brunswick, 1952), the beliefs cue weighs heavier for ideological extremes (vs. moderates) when they judge the favorability of groups (Woitzel & Koch, 2021).

Last but not least, how do individuals differ in the way they use the status cue to judge the favorability of all sorts of groups? Besides homophily by status (Koch, Imhoff et al., 2020), it turns out that groups' status increases homophily by ideology. That is, people favor and like ideologically similar groups even more if the status of the groups is relatively higher. In contrast, people favor and like ideologically dissimilar groups even less if the status of the groups is relatively higher (Roberts & Koch, 2021).

The great takeaway of all this research is that representative design in the sense of studying individual instead of averaged judgments advances the impression formation literature by clarifying how people differ in the way they infer groups' distal, latent favorability from two proximal, manifest cues – the groups' status and beliefs. An exciting new direction of research is that goals can make the same people pay attention to different cues (Nicholas et al., 2021).

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How Accurately Can People Resolve Trade-offs?

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Previous research in multiple judgment domains has found that nonlinear functions are typically processed less accurately than linear ones (Brehmer, 1971, 1979; Karelaia & Hogarth, 2008). This empirical regularity has potential implications for consumer choice, given that nonlinear functions (e.g., diminishing returns) are commonplace. We investigate how accurately people can trade off magnitudes when comparing a product's attributes against its price. In experimental studies we measured precision and bias in consumers' ability to identify surpluses when returns to product attributes were nonlinear. We hypothesized that nonlinear functions would reduce precision and induce bias toward linearization of nonlinear relationships. The work builds on the recent development of the Surplus Identification Task, in which participants learn and apply an objective value function for deciding whether a multiattribute product is good or bad value relative to its price. Three experiments imply fundamental limitations in the precision with which people can resolve trade-offs when integrating attribute magnitudes. The imprecision co-exists with systematic bias, despite feedback and incentives. Performance is similar across types of attributes (visual, numeric, or categorical) and when participants judge familiar products (houses and broadband packages) against market prices. Overall, our findings imply that trade-offs are processed by a flexible but coarse mechanism.

For additional information, please see: Lunn, P. D., & Somerville, J. (2021). Consumers' ability to identify a surplus when returns to attributes are nonlinear. *Judgment and Decision Making*, 16(5), 1186-1220.

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Blinding Data in Science and Society: A Lens Model Framework

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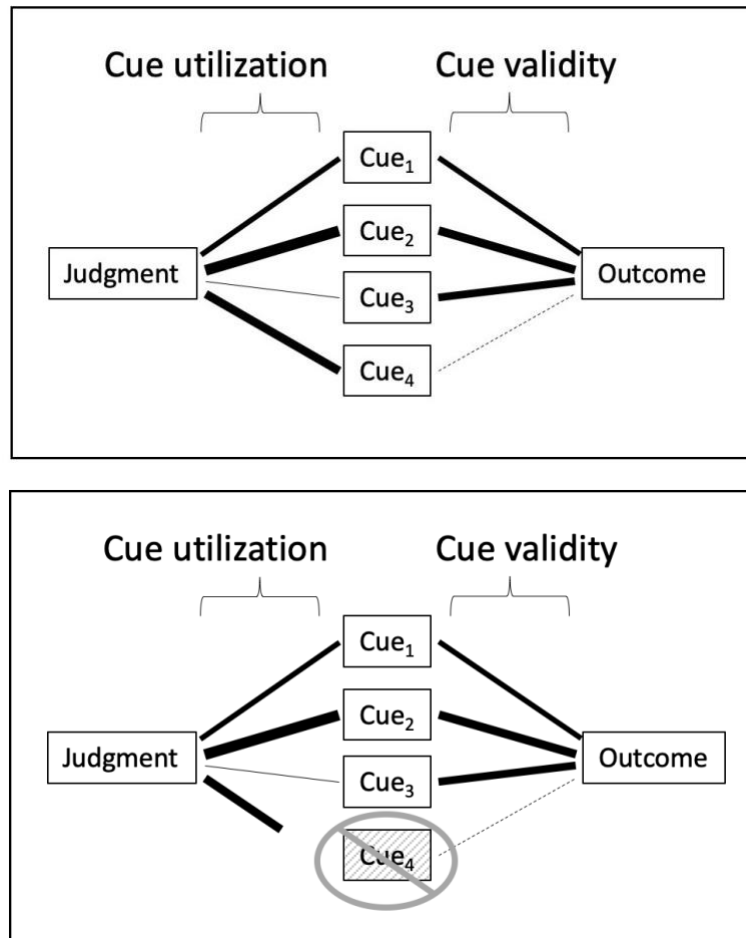
In recent work, I have been examining the use of methods of blinding of potential biasing information to improve the validity and/or fairness of judgments in scientific data analysis, scientific peer review, and the screening of job applicants. Here I briefly highlight how the Lens Model provides a useful conceptual tool for thinking about the effects of blinding.

Readers will be familiar with the use of blinding to keep treatment recipients (single blind) and treatment deliverers (double-blind) in the dark about experimental interventions. Less commonly, clinical researchers withhold the identity of the treatment condition from the data analysis (triple blinding).

Recently, I have written several papers with physicist Saul Perlmutter (MacCoun & Perlmutter, 2015, 2018) on how many physicists add noise or bias to their data before analyzing it, so that any pre-conceptions or careerist motivations can't bias their inferences. A blinding method is selected to facilitate intermediate analytic decisions while precluding choices that would favor one hypothesis over others. The blind is then lifted once all analytic decisions are made. Triple blinding can be seen as a special case («row scrambling») of blinded data analysis, though physicists' methods are more diverse and elaborate.

Another form of blinding is increasingly used in social decision making to try to “debias” job hiring and other selection processes in the marketplace. In 2000, Claudia Goldin and Cecilia Rouse described a blinding method used by major orchestras to combat gender and racial bias. In the blind audition procedure, auditioning musicians performs behind a screen so that the selection committee can hear but not see them. Since 2000, many jurisdictions have adopted blinding of job applications toward a similar end.

Egon Brunswik's lens model provides a useful framework to model how blinding might reduce bias. Figure 1 shows a typical lens model diagram, and Figure 2 shows the model when one cue is intentionally blocked by blinding. The right side of the lens depicts the true relationships among a set of cues or predictor variables and some outcome of interest. The left side of the lens shows the relationships among these cues and a judgment (prediction, decision) made by some judge (referee, editor, scientist, selection committee) – their implicit judgment policy. I vary the thickness of the arrows to show the strength of the relationships on each side. By comparing the judgment to the outcome, we can assess the validity of the judgment. But a lens-model analysis tells us more by allowing us to compare the signs and magnitudes of the arrows on each side of the lens. It can show where judges are using a “bad cue” or missing a “good cue”, in which case we might intervene with training, blinding, or simply replacing the judge with the algorithmic model on the right side of the lens.



These figures are an oversimplification. Typical lens model applications depict a multiple regression or path coefficient for each link, along with additional links showing cue intercorrelations. A more ambitious extension – one I haven't seen in the lens model literature -- might be to depict each side of the lens as a directional acyclic graph (DAG; Pearl, 2000) which could show that the causal structure of the judgment process (left side) misrepresents the causal structure that produces the outcomes (right side); e.g., a judgment might overutilize a cue that is actually a spurious correlate (no causation) or even a consequence (reverse causation) of the outcome.

The lens model framework provides an explicit framework for thinking about how and when to blind effectively. Blinding is appropriate when current judgments are giving undue weight to a particular cue, or using a cue that is actually spurious. Blinding may be unnecessary when a valid cue is being used appropriately, or when an invalid cue is already being ignored. But a lens-model analysis might also show that blinding (whether of humans or of algorithms) might have unintended consequences when good and bad cues are intercorrelated, a point I return to later.

The lens model is most useful for questions of validity: What are the true predictors of an outcome and does the judge have a valid mental model? It does not readily depict cue utilization with respect to other normative criteria. In particular, some applications of blinding are motivated by concerns about fairness rather than (or in addition to) validity. Even then, the lens model can

clarify our discussions of fairness. Is a cue “unfair” because it has low validity, or are some cues unfair even when they are valid predictors? Are there normative reasons to retain some cues even when they are low in validity?

Research on these new forms of blinding is still in its early stages, and there are many unanswered questions; for example:

- Does blinding actually blind? Or can the decision maker deduce the correct identifying cue from other cues?
- Can blinding do more harm than good? Under what circumstances might the benefits of blinding be outweighed by the need to provide decision makers (e.g., physicians) with complete information?
- Will biases “find a way” (with apologies to *Jurassic Park*)? Might blocking a bias through blinding just open a path to a different manifestation of bias? For example, to reduce racial bias in hiring, many jurisdictions adopted “ban the box” policies that prohibited employers from including a “criminal history” checkbox on job application forms. Unfortunately, there is evidence (Agan & Starr, 2018) that this policy has the opposite effect – it significantly reduces the hiring of members of groups that employers associate with criminality. In essence, when blinding blocks employers from considering criminal justice information, they will often use race or ethnicity as a proxy, potentially replacing a smaller category (men with criminal records) with a larger one (men of color).

The logic of blinding is relatively straightforward when there is a single normative system (e.g., “find the truth”) for defining bad cues. Things get more difficult when there are *conflicting* normative demands – e.g., validity vs. fairness. Then, a cue might be “good” with respect to one system but “bad” with respect to another. These issues have been explored in depth in the professional literature on the psychometrics of ability testing and assessment, but they have not been solved or resolved, and I suspect similar issues will arise in applications of blinding in other domains.

This essay summarizes key points from a more complete discussion: MacCoun, R. J. (2020). Blinding to remove biases in science and society. In R. Hertwig & C. Engel (eds.), *Deliberate ignorance: Choosing not to know*. Cambridge, MA: MIT Press.

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Toward a More Ecological Cognitive Neuroscience

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Human neuroscience has inherited a great deal of its methodology from psychology. We are trained to develop clever laboratory manipulations in hopes of discovering fundamental principles of brain function. In the past decade, however, there has been increasing concern about the “ecological validity” of our neuroscientific models. Tracing the historical development of this term led me to Brunswik’s work (e.g., Brunswik, 1955). I’m sure anyone reading this is familiar with the sense of astonishment at finding something written over 60 years ago that’s so pertinent to the problem at hand. In an effort to find points of contact between contemporary cognitive neuroscience and Brunswik’s ideas, we recently published an opinion piece in the *NeuroImage* special issue on naturalistic neuroimaging (Nastase et al., 2020). In the following, I’ll briefly describe the challenge of ecological validity in neuroscience, then highlight two modern parallels of Brunswik’s ideas that we believe can provide a way forward.

Our neuroscientific models often grow out of a particular lineage of laboratory tasks designed to decompose a complex phenomenon into manageable subcomponents. There’s an implicit assumption in much of our thinking and writing that the resulting models can be recomposed into a satisfying understanding of “real-world” brain function. Although this paradigm has led to a number of fundamental insights, we’re left with a veritable zoo of piecemeal models that are difficult to synthesize and, considered individually, account for a disappointing amount of variance under natural conditions. We are trained to clamp or orthogonalize “confounding” variables in the laboratory, but these variables often interact in real-world contexts—and when we remove the experimental constraints, our measurements of neural activity sometimes recoil in unexpected ways. For example, the well-behaved orientation tuning observed in primary visual cortex (V1) during highly-controlled experiments has been shown to shift in response to natural images (David et al., 2004); in a similar vein, seemingly consistent responses to static face images diverge in response to dynamic, naturalistic videos (McMahon et al., 2015). These failures to generalize—due in part to biased stimulus sampling and a tendency toward easily-interpretable models—set off the alarm bells. Olshausen and Field (2005) famously cautioned that “we can rightfully claim to understand only 10% to 20% of how V1 actually operates under normal conditions.” The challenge is this: the brain is shaped by evolution and learning to capitalize on the real-world regularities we often try to factor out in our experiments; and any brain variable we measure is contextualized not only by the history and motivation of the organism as well as the state of the environment, but also by countless other brain variables we cannot simultaneously measure.

How should the cognitive neuroscientist negotiate this challenge going forward? Brunswik argued that ecological generalizability demands a “representative sampling of situations” where “situational instances in an ecology are analogous to individuals in a population” (Brunswik, 1955, p. 198) and that the “challenge of further [isolating variables] must be met by after-the-fact,

mathematical means” (Brunswik, 1955, pp. 202–203). This resonates with more recent arguments for “late commitment” (Kriegeskorte et al., 2008, p. 19) and “system identification” (Wu et al., 2006) in cognitive neuroscience, where theoretical assumptions are relaxed at the stage of experimental design and data collection, and hypotheses are formalized as quantitative models to be evaluated on naturalistic data. To date, many of our neuroscientific models hinge on small datasets specially manufactured by individual labs to address very particular questions. Advancing the field on this front will require large, naturalistic datasets to serve as public community benchmarks for model development and comparison (Rocca & Yarkoni, 2021). Our first step forward, then, is a pragmatic one: building on Brunswik’s notion of representative design, we hope to share rich, naturalistic datasets and promote community-driven model development to cope with the complexity of our data and the multiplicity of models.

The second parallel pertains to the synthetic neuroscience emerging from the machine learning community. In recent years, we’ve seen a proliferation of neural network models that actually “work” in the real world—that is, end-to-end deep learning models that can reproduce complex human behaviors (such as language comprehension) strikingly well in uncontrolled, real-world contexts. These algorithmic models are a radical departure from the explanatory models traditionally developed in experimental neuroscience (for better or worse, marketability is a stronger “selection pressure” for machine learning models than interpretability). These are “functional” models in the sense that they receive messy, naturalistic inputs (e.g., photographs, text) and must ultimately learn to produce outputs—or “act”—in service of a complex objective (e.g., identifying faces, predicting forthcoming words). We can then interrogate what these models have learned, with variation across architectures, learning rules, and objective functions, and how their internal representations relate to those of the human brain (Richards et al., 2019). Although this new family of models is still in its infancy, we believe that deep learning has important parallels with ecological psychology and will yield unexpected insights into brain and behavior (Hasson et al., 2020).

I hope the reader will forgive our late arrival to Brunswik’s work and will take the parallels highlighted here as a good-faith effort to draw inspiration from Brunswik’s insights. If this work piques any interest, our published articles provide a more detailed treatment (Hasson et al., 2020; Nastase et al., 2020) and we welcome any feedback. These ideas are reverberating in the neuroscience community right now, and it seems like an opportune time for us to learn from those working in Brunswik’s tradition.

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Examining Wisdom Using a Nomological Lens Model Network

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The scientific investigation of wisdom is notoriously difficult due to the elusiveness of the construct. Wisdom is thought of as a complex, multi-faceted construct encompassing different components such as personality traits (Ardelt, 2004) and wisdom-related knowledge (Baltes & Staudinger, 2000). Perhaps not surprisingly, there is a multiplicity of models postulating different definitions, nomological networks, and assessment strategies that, however, do not fully converge. This resulted in a scattered body of literature, jingle- (i.e., same term for different constructs) jangle (i.e., different terms for the same construct) fallacies, and limited psychometric validity of wisdom measures. A productive and cumulative science of wisdom calls for an integration of wisdom models and empirical findings. To this end, we propose to use a Nomological Lens Model Network (NLMN; Rauthmann, 2017a; see Figure 1) – a framework that combines nomological networks (Cronbach & Meehl, 1955), Brunswik’s lens model (Brunswik, 1952), and the 4Ps (Person, Presses, Products, and Processes) as derived from creativity research (Rhodes, 1961). We have applied an NLMN to understand wisdom better (Phan et al., 2021).

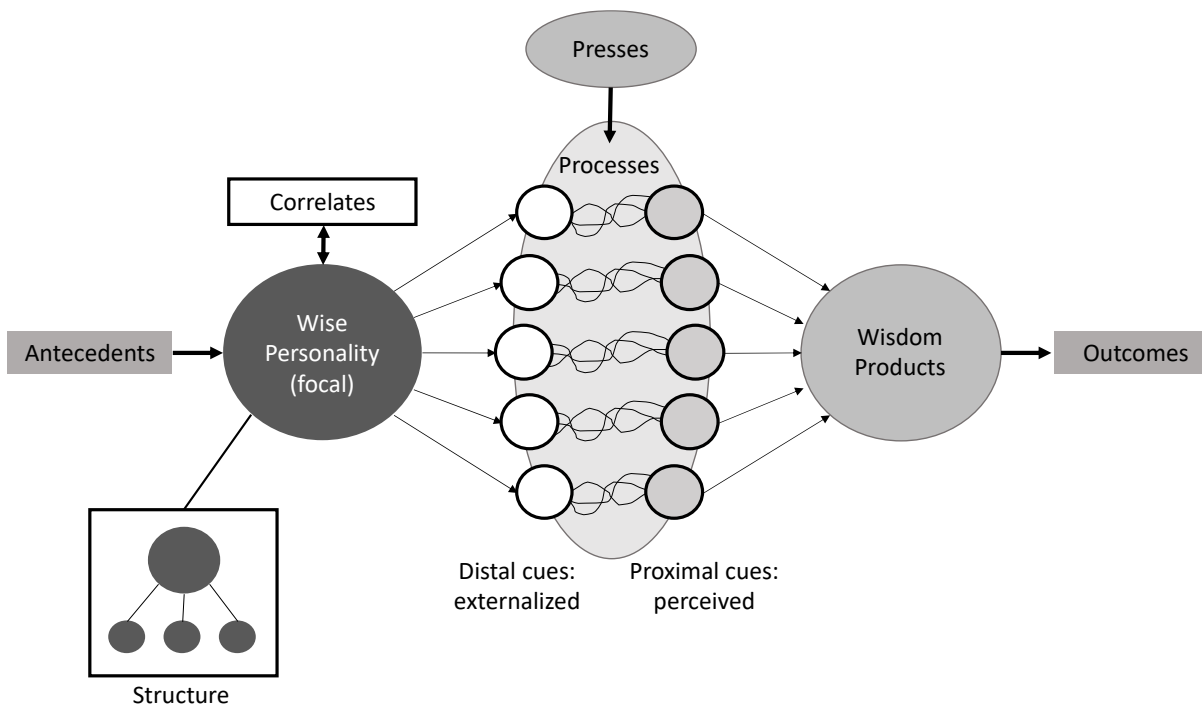


Figure 1. The Nomological Lens Model Network of Wisdom modified from Rauthmann (2017a).

The nomological network and the lens model approach provide a diagnostic perspective, while the 4 Ps allow for a conceptually meaningful categorization of constructs. First, the nomological network part captures issues surrounding construct validity (Cronbach & Meehl,

1955). A nomological network can be seen as a (pre-)theory about the target construct, including formal statements about (a) (working) definitions of the focal construct (i.e., wisdom) and its components, (b) its observable manifestations (i.e., wise behavior), (c) its concurrent convergent and discriminant relations with (measures of) other constructs, (d) its relations to relevant antecedents (i.e., precursors of wisdom) and outcomes (e.g., personal well-being or societal impact), and (e) causal processes connecting the focal construct with relevant variables. Formalizing a nomological network is vital when there are no agreed upon construct definitions or criteria that justify the usefulness of the construct's measure (Cronbach & Meehl, 1955). Additionally, systematically integrating different models of wisdom enables the identification of common components and blind spots across models, thus contributing to better content validity.

Second, the lens model part specifies tangible cues (wise behaviors) that are (a) externalized by a person (distal cues) and (b) perceived by others (proximal cues) or are directly linked to wisdom-specific outcomes (e.g., conflict resolution). For wisdom, proximal cues do not have to necessarily overlap with distal cues but can be behavioral consequences thereof (e.g., perceiving others' respect for the target person without witnessing causative behaviors). In these cases, criterion validity can be evaluated by assessing the symmetry (i.e., whether predictor/behavior and criterion/product are specified at the same level of resolution) and overlap between distal and proximal cues (a lack of which may result in a biased estimation of the true effect), thereby taking the bandwidth-fidelity trade-off into account (Cronbach & Gleser, 1957). For wisdom, the lens represents processes relevant for a wise reputation (i.e., perceptual judgement processes) or for consequences indicative of wisdom (i.e., wisdom-specific processes, such as wise reasoning).

Lastly, the NLMN framework includes the 4Ps as pre-defined categories meaningful to personality science. The 4Ps are Personality, Products, Processes, and Presses and are intertwined with the nomological network and lens model parts. These categories are useful to approach wisdom from a personality-psychological perspective because they represent generic overarching components. This facilitates the categorization and comparison of different wisdom models, pointing out jingle-jangle fallacies, commonalities, and blind spots. The identified commonalities also represent useful categories across which empirical findings can be meta-analytically aggregated.

Personality collectively refers to enduring characteristics such as traits, abilities, skills, attitudes, temperament, needs, motives, goals, interests, expectancies, attribution styles, self-regulation, coping styles, attitudes, value systems, beliefs, self-concepts, and narrative identity (Rauthmann, 2017b) and is expressed via distal cues (i.e., wise behavior). Personality is linked to Products via Processes and Presses. Products result from perceived wise behavior or traces thereof (i.e., proximal cues) and can be a wise reputation or relevant consequences (e.g., wisdom-related knowledge). Presses are contexts (e.g., situation or environments) in which wisdom can occur or that evoke wise behavior. Following an interactionist view (Lewin, 1946), both distal and proximal cues inherently occur in-context and are thus determined by both the Person and Presses as well as their interactions. Processes link Person with Products (i.e., the lens) and are an inherently dynamic, causal series of steps through which phenomena take place. However, the identification of relevant processes requires established phenomena based on a sound theoretical and empirical foundation. Moreover, processes are often contextualized and specific to the individual, which further complicates their identification. Hence, we argue that the identification of wisdom

processes as explanatory accounts must be preceded by the establishment of descriptive accounts (e.g., consensual definitions and valid assessment).

In conclusion, we believe that the NLMN can be a viable tool for wisdom research (and also other constructs). The integrative and systematic approach of the NLMN could facilitate the identification of commonalities and blind spots across models, thus promoting conceptual clarity as a precursor for psychometric validity and fostering a cumulative science of wisdom.

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Viewing Attitude Research Through a Brunswikian Lens

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Egon Brunswik was a scholar with a trait that is indispensable for scientific progress—a free spirit. His independent thinking inspires junior and senior scientists to conduct research that is original and creative to this day. A core aspect of owning this sort of esprit is the courage and capability to critically reflect on even the most established assumptions of a theory or a research paradigm, and generate novel perspectives on old phenomena. If a researcher has valid points and provides rational reasons to challenge a theoretical assumption, extend a conceptual framework, utilize a different method, or finds alternative accounts for the interpretation of empirical results, then (s)he should feel free to do so—even or maybe especially when this new view on things does not correspond with the current zeitgeist and the most prevalent beliefs of a specific field. Science must not progress according to a “one funeral at a time” principle, as Planck (1950) critically described it. Instead, science should progress based on rational argumentation and empirical evidence. This liberal approach to the sociology of scientific knowledge enables paradigm shifts (Kuhn, 1962) and safeguards methodological plurality (Feyerabend, 1975, 1978). The thorough inspection of Brunswik’s life and work provides ample exemplars of how he achieved this high degree of intellectual integrity (Gigerenzer, 2001).

The goal of the present theoretical contribution, derived from the rationale outlined above, is to argue for the adoption of a Brunswikian lens in order to enrich a major social psychological field of study—research on attitudes and attitude change (Allport, 1935). One of the main assumptions of attitude research is that the central driving force of the acquisition and the change of attitudes is valence. Simply speaking, humans like positive things and dislike negative things, they acquire positive attitudes towards objects, subjects, and situations that appear pleasant to them, whereas they acquire negative attitudes towards objects, subjects, and situations that appear unpleasant to them. This psychological fact is extensively studied and widely accepted. Evaluative conditioning makes a perfect example: The valence of a previously neutral stimulus (CS) changes after pairing it with a positively valenced stimulus (US+) or a negatively valenced stimulus (US-). That is, a CS – US+ pairing creates CS+, and a CS – US- pairing creates CS- (for a meta-analysis, see Hofmann et al., 2010). Now, please consider the following thought experiment: A study participant is presented a set of neutral faces of strangers. In each trial, a face (CS) is presented simultaneously with a piece of music (US). In the US+ condition, music is presented that sounds happy, predominantly entails major chords, and is generally considered to be emotionally uplifting music. In the CS- condition, music is presented that sounds sad, predominantly entails minor chords, and is generally considered to be emotionally saddening music. According to the notion that valence determines attitude formation, one would predict that CS – US+ pairings create CS+, and CS – US- pairings create CS-. But what would happen if the participant cannot identify with the genre of the US+? Similarly, what would happen if the participant thinks that the US- was beautifully composed? In these cases, would we then not expect the pattern of results to reverse?

While I acknowledge that valence plays an imperative part in attitude formation, the purpose of this thought experiment is to raise awareness for the possibility that an attitude might be more than a preference or an aversion based simply and solely on valence. I wish to propose the idea that valence can be conceived of as a lower-order dimension within a hierarchical attitudinal space. This attitudinal space may include higher-order dimensions, which are of propositional nature, meaning that they form more symbolic, abstract, and generalized representations in attitudinal space. Possible candidates for higher-order dimensions are beliefs on an intermediate stage of cognitive representation, and values on an upper stage of cognitive representation. I claim that both beliefs and values can modulate valence-based attitude learning. Returning to our thought experiment, a belief in the inferiority of the genre of the CS+ as well as assigning value to CS- due to its compositional excellence can arguably produce modified or even surprising effects, respectively. Hence, beliefs and values may function as moderators and boundary conditions of the impact of valence on attitude learning. I therefore propose that the consideration of other, more distal constructs can be helpful to gain a more comprehensive understanding of attitude formation. Yet another idea to embed valence into a larger attitudinal framework is to construe it as one dimension within a space of affective meaning (Osgood et al., 1957), which covers two other dimensions—potency and activity. This multidimensional approach to attitude learning acknowledges the relations between different stimulus dimensions and preserves them (Brunswik, 1955, 1956). It takes into account the notion that cognitive functioning is adapted to the structure of its specific stimulus ecology (Dhmi et al., 2004; Fiedler, 2020). Indeed, we demonstrated that the multidimensional conceptualization of affective meaning yields differential effects for different forms of learning when stimulus sampling matches the prototypical distributional pattern of stimuli in affective space. We found that stimulus pairing determines the learning of evaluation and activity, whereas stimulus exposure elicits the learning of potency and activity (Richter & Hütter, 2021). These findings exemplify how proper theorizing and the implementation of representative experimental designs can stimulate novel insights and a more comprehensive understanding of psychology phenomena.

To conclude, I hope to inspire fellow researchers to put on a Brunswikian lens from time to time in order to question common—and possibly erroneous—assumptions in their field of study. Stimulating divergent thinking patterns in a priori theorizing on well-established psychological phenomena (e.g., attitude learning) can inspire the deduction of novel hypotheses, empirical tests thereof, and eventually advance and refine theory building (Fiedler, 2017, 2018). I believe this would have been in Brunswik's spirit.

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Is There Anyone We Haven't Offended? Brunswikian Researchers, Join the Club

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We recently published a paper whose title, “The futility of decision making research”, conveys its sad conclusion. The primary theme is that in order to make model testing feasible, JDM researchers followed Ward Edwards's strategy of using toy problems that were poor analogs to the important decisions they purported to study. Pertinent to this group is our prediction is that, like the Functional Measurement tradition in which we were raised, most Brunswikian research is headed to the dustbin of history, having chosen the model to be the message.

We don't understand why a society, and a research agenda, should be named after a person. Ideas, especially regarding tasks, should be the focus. The cult of personality leads to isolation, depriving the members of the criticism, the competing notions, that make for scientific progress. It's not just a matter of the name, of course. The Functional Measurement Meetings were similarly insular although Norman Anderson's name was only implicitly attached. Even when quarrelsome insiders gave talks that addressed serious misgivings, the issues were ignored and people just kept on testing models. Shanteau challenged functional measurers with "What have you measured lately?", and Weiss railed about the danger of artifactual model support inherent in using single-subject designs - to no effect.

We do think Hammond had some good ideas. The correspondence vs. coherence distinction he brought out is very important. Thinking about that contrast helped to inspire the Futility paper. And representative design is certainly a fine goal; it forces one to think about the task. Shouldn't all of the abstractions imposed by an experimenter keep in mind what the study is about? It's a guideline for research that has nothing to do with the lens model. The central thesis in the Futility paper could have been couched as a plea for representative design.

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BOOK REVIEW

“Noise” and Social Judgment Theory: A Commentary on Kahneman, Sibony, and Sunstein

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The book *Noise: A flaw in human judgment* by Kahneman, Sibony, and Sunstein (hereafter, KSS) is a step toward fulfilling the promise inherent in judgment and decision making (JDM) of greater understanding of judgment processes and also better decision making. JDMers have long been delivering on that second promise by teaching, consulting, and writing books such as Thaler and Sunstein’s *Nudge* and Hammond’s *Human Judgment and Social Policy*. This paper is aimed at two sets of readers. One is, of course, the readers of this newsletter. The other set is the authors of *Noise*, to whom we have sent a copy. To those who have not read “Noise,” we encourage you to read it.

Noise is defined by KSS as “unwanted variability in judgments” and, according to them, noise has been largely ignored by the JDM community. In their words on p. 10 “The topic of bias has been discussed in thousands of scientific articles, ... few of which even mention the issue of noise.” They go on to write:

Understanding the problem of noise, and trying to solve it, is a work in progress and a collective endeavor. All of us have opportunities to contribute to this work. This book is written in the hope that we can seize those opportunities. (KSS, p. 14)

Our objectives

We read KSS with great interest because they address problems that have been the focus of Brunswikian research and Social Judgment Theory (SJT) since 1955 (although the word “noise” is rarely used in that research). We thought it would be useful to describe the approach that SJT has taken to problems that KSS describe. In a spirit of cooperation, desiring to contribute to KSS’s efforts to make JDM research useful in practice, we explore noise from the perspective of SJT and indicate its possible relations to their prescriptive ideas. We begin with brief summaries of two

analytical tools that have proven useful in SJT research and application: judgment analysis and the lens model equation.

Judgment analysis (JA)

Judgment analysis (sometimes called “policy capturing”) is a powerful method for externalizing the consistent policy underlying inconsistent judgments. Holzworth describes the birth of judgment analysis:

... judgment analysis as a field of endeavor got its start as a systematic approach to cognition with Hammond's article titled "Probabilistic Functionalism and the Clinical Method" (published in the Psychological Review in 1955). For whereas Meehl's book showed the superiority of statistical prediction over clinical prediction and thus cast doubt on the value of the latter, Hammond's article took a theoretical approach to the analysis of judgment. Brunswick's lens model was used to analyze, or externalize, the judgment processes of clinical psychologists, thus demonstrating that the lens model could be generalized from visual perception to clinical judgment. Judgment analysis, as the term is used now, was born at that point. (Holzworth, 2001, p. 324)

The data for judgment analysis (JA) are a set of judgments (Y_s) made by a single judge presented with a set of cases defined by varying values on a set of cues (X_i , multiple fallible indicators). Although not limited to linear models, a typical judgment analysis is based on standard linear least squares regression analysis. JA methods have been extended and adapted in many ways (e.g., Holzworth, 1996, Stewart, 1976). For details of JA methods, see Cooksey (1996).

For our purposes, we will simply point out that JA leads to a decomposition of judgment into a systematic part that is a function of the cues and a residual part, sometimes called error, that is not related to the cues. That decomposition leads to a standard decomposition of variance that is central to the topic of this paper.

$$\sigma_{Y_s}^2 = \sigma_{\hat{Y}_s}^2 + \sigma_{E_s}^2$$

In words,

Total judgment variance = systematic variance + unsystematic (“error”) variance

or, using KSS terms (p. 190),

$$(\text{Pattern noise})^2 = (\text{Stable Pattern Noise})^2 + (\text{Occasion Noise})^2$$

The multiple correlation (R_Y^2) is considered a measure of the judge’s consistent use of cues while $(1-R_Y^2)$ is a measure of inconsistency, that is, variance in judgment not related to the cues.

Hundreds of studies have shown that JA provides useful models of judgment even if those models are not isomorphic to the mental operations of judgment (Hoffman, 1960). A major application of JA is “cognitive feedback” showing people the weights and functional relations that

describe their own policy. Such feedback is much more effective than the traditional outcome feedback for learning complex multiple-cue tasks. It has also proven useful in interpersonal learning, negotiation, and resolving disagreements.

The Lens Model Equation

While the analyses described below apply specifically to situations in which a judge or judges make repeated judgments of situations characterized by multiple fallible indicators (cues), the experimental and analytic work is broadly generalizable to many judgment and decision situations. The body of research and theory to which we refer originates in the rich tradition of Egon Brunswik. That body of research and theory is based on Brunswik's Lens Model and Social Judgment Theory (SJT) as explicated by Kenneth Hammond (1996) and many others.

Considering the readership of this newsletter, we will not dwell on the lens model, but simply remind the reader of the simplified (basic) lens model equation (LME) and its components. (For this short paper, we have omitted the second term of the original LME because it is usually small enough to be ignored.)

$$r_a \cong GR_e R_s$$

The correlation r_a is called achievement and denotes how well a person's judgments match an environmental criterion. An important aspect of an environment is its predictability, measured by the multiple correlation R_e between multiple fallible indicators (cues) and the environmental criterion. R_e is closely related to what KSS call "objective ignorance." In many situations "objective ignorance" can be estimated by $(1-R_e^2)$. Similarly, judgmental consistency is measured by the multiple correlation R_s between cues and judgments. R_s is closely related to what KSS call "occasion noise" which can be estimated by $(1-R_s^2)$. G is the correlation between the outputs of linear models of two sides of the lens. G is typically high. There is nothing in KSS corresponding to G .

Bias is not represented in the LME because it is based on correlations which do not reflect differences in means. However, Stewart and Lusk (2000) developed an extended version of the LME that does include bias, and bias is clearly an appropriate topic for study within SJT (e.g., Ullman and Doherty, 1984).

Interpersonal agreement

The LME can also be applied to the study of agreement between people, in which case r_a represents agreement rather than achievement. For KSS, disagreement $(1-r_a^2)$ is the most important consequence of "noise." In research on disagreement the role of inconsistency is evident. The lens model can be used to model judgments of two people making judgments of the same set of cases. Analysis of those judgments will yield two R_s values which factor into the analysis of agreement, r_a , as follows:

$$r_a \cong GR_{S_1} R_{S_2}$$

Thus, the LME clearly demonstrates how inconsistency, i.e., lower multiple correlations between judgments and cues, severely affects interpersonal agreement in that agreement involves the

product of two correlation coefficients that are both affected by inconsistency. Dhimi and Olsson (2008) discuss evolution of the lens model for investigating interpersonal learning and conflict.

Single individuals

Another application of the lens model is the single system case, which may be used to great effect in cognitive conflict situations, as will be explored below. The single system case describes, based on judgment analysis, the cue usage of a single individual without reference to an environment or another individual. The values of R_s and the cue utilization coefficients are calculated, but the indices r_a and G are not involved. To the extent that people are inconsistent (i.e., low R_s), their judgments of an external criterion will be less accurate, and they will disagree more with their colleagues. Additionally, they'll disagree more when their cue utilization coefficients differ from their colleagues' weights.

Inconsistency of judgment

An extensive body of research in judgment and decision making has focused on judgmental inconsistency (“occasion noise” for KSS) and disagreement (“noise” for KSS). Much of that work has been conducted within the framework provided by SJT. Among the findings are that inconsistency is pervasive in human judgment and contributes both to inaccurate judgment and disagreement. The LME allows us to quantify these effects and separate effects of inconsistent and consistent components of judgment. Furthermore, we understand that inconsistency is affected not only by characteristics of the judge, but also by characteristics of the task (environment).

It would be hard to improve on the words of Berndt Brehmer. In his 1976 *Psychological Bulletin* article, *Social Judgment Theory and the Analysis of Personal Conflict*, he cited evidence that

...the empirical fact of inconsistency remains, and it is the lack of consistency that explains why people fail to reach stable agreement.

...Inconsistency not only produces conflict, it also leads to a lack of understanding. Brehmer and Hammond (1973) pointed out that such a lack of understanding may lead to severe problems in reducing conflict. Since the persons in conflict cannot understand their opponents in terms of any systematic differences in policy, they will seek other explanations for the failure to reach agreement. Because behavior is usually explained in terms of motives or ability, these explanations will almost inevitably involve assumptions about hidden sinister motives on the part of the other. Explanations of this kind are, of course, not likely to facilitate resolution. (1976, p. 1000).

Brehmer, in this and other papers, has extensively explored the ramifications of inconsistency using the technology of SJT.

Consistency of judgment: judgment policy vs. stable pattern noise

What is called “judgment policy” in SJT research is called “stable pattern noise” by KSS. This is a fundamental difference. Judgment policy describes the consistent component of

judgment. It reflects the goals, values, training, and experience of the judge. As KSS point out, this is often the most important source of disagreement. However, in our view, rather than just being considered a source of “noise,” differences in judgment policy should be taken seriously and examined carefully because they often reflect the grounds for honest differences of opinion. Furthermore, extensive research has shown that people, even experienced experts, have difficulty accurately describing their judgment policies. In other words, they lack self-insight. Inconsistency, along with that lack of self-insight can exacerbate conflict when people attribute judgment differences to traditional explanations: incompetence, venality, or ideology. Hammond (1965) described another explanation—cognitive conflict—and designed a research paradigm for studying it. That has led to many laboratory studies and to a prescription, based on cognitive feedback, for resolving disagreement that has been used in a number of applications.

Research within SJT

We turn now to a few investigations to show that judgment analysis can represent useful aspects of the underlying cognitive process of judgment and to argue that judgment analysis can clarify what is noise and what is consistently applied judgment. Our argument relies on two sets of empirical facts: judgment policy equations predict judgments of holdout samples, and people can recognize statistical representations of their own policies to a high degree of accuracy. In this section we also describe investigations showing that judgment analysis has been successfully applied in practice.

The validity and reliability of judgment analysis

Reilly and Doherty (1989) investigated job choice behavior of university seniors who were graduating with a bachelor’s degree in accounting. Forty seniors made holistic evaluations of 160 hypothetical job offers each described by 19 attributes. Job attributes were based on surveys of accounting companies. The judgment policies calculated for each student were shown to be reliable by traditional cross validation procedures. Eleven students acceded to a request to return for a second session. These returnees were asked to select their judgment policies from a 40 X 19 matrix of attribute utilization coefficients (Darlington, 1968). Seven of 11 selected their own policies. The probability of 7 or more successes in 11 chances under the assumption of random selection ($P = .025$) is 1.84×10^{-9} . The recognition results just described conflict with the accepted view that people have poor self-insight. The situation may be illuminated by the following analogy. I can’t describe my own face very well in words and numbers, but I can pick my own face out of a set of pictures.

The accuracy of self-insight as assessed via recognition was replicated and extended by Reilly and Doherty (1992) and Reilly (1996). Such a remarkable degree of insight provides evidence for the construct validity of JA because it shows that the resulting policy descriptions are meaningful to the judges. This convincingly demonstrates that judgment analysis can measure what it claims to measure.

Investigation of hiring policies of insurance agency managers

Roose and Doherty (1976) used lens model technology to investigate hiring policies of insurance agency managers. The company provided 360 case files, 200 of which were used to

create profiles to be judged by each of 16 agency managers, the other 160 serving as a holdout sample for cross validation. Each case was represented by 66 cues. The cross-validated R_s values, i.e., the cross-validated multiple correlations representing the judge's consistent cue usage, ranged from a low of .45 to a high of .70. This is an example of hundreds of studies showing that judgments can be described by a systematic policy that is implemented with low to moderate consistency.

When judgments were averaged over managers, the cross-validated R_s of the composite judge was .74, higher than that of the highest individual, and consistent with the repeated exhortation in KSS to aggregate judgments. The judgment results led to a series of recommendations to the company, several of which were adopted.

An investigation of bias in faculty salaries

In light of a claim of sex bias in faculty salaries, Roose and Doherty (1978) investigated the salary structure of the faculty at Bowling Green State University. The university administration fully supported the investigation and urged faculty cooperation. Lengthy questionnaires concerning education and performance were sent to all faculty. There were 349 usable questionnaires returned, from which 28 variables were selected. A total of 175 profiles were constructed, 25 of which were repeated for purposes of assessing reliability. Gender was not shown on the profiles. Ranks and salaries were then assigned by each of 42 faculty volunteers.

Each faculty judge's policy equation was applied to the 28 variables describing each of the 349 faculty respondents. Discrepancy scores were calculated for each respondent between the mean of the 42 scores assigned to that respondent and that respondent's actual salary. The results indicated a modest degree of sex bias in faculty salaries. The most immediate result was that the authors provided a list of case numbers for cases that met certain criteria to the administration to be matched with names, which were unknown to the investigators, in order that the administration might consider redress. The vice president of the university who paid for the study did make salary adjustments based on our data at that time. Two years later he requested that we use the equations to address a salary inequity claim by a non-participant who then agreed to complete the lengthy questionnaire.

Unpublished was the comparison between the predictions of holdout samples of salary assignments via subjective weights vs. predictions via policy weights. Forty of the 42 judges also provided subjective weights. For all 40 judges, policy weights outpredicted subjective weights ($p = 9.09 \times 10^{-13}$).

To summarize, Roose and Doherty used judgment analysis to isolate the consistent component of judgment from the inconsistent component, thereby reducing unwanted variability that contributes to conflict. Doing so allowed them to develop equations that were used to help resolve salary disputes, one of the most contentious issues in any organization.

Labor negotiations

Balke, Hammond and Meyer (1973) explicitly used SJT in a negotiation setting in the corporate world. Their study bears directly on the issue of inconsistency in interpersonal situations, especially how inconsistency can wreak havoc and generate system noise. In the words of the authors:

Inconsistency means that identical circumstances do not always evoke identical judgments. When inconsistency is noted by others, it may give rise to the observation that words do not match deeds. When this observation is combined with the traditional motivational explanation, it leads us to assume that an individual's behavior is self-serving... (p. 312)

That is an early description of the roots of conflicts that are rooted in cognitive limitations rather than in motivation. The research describes a reenactment of the negotiations over a bitter strike and shows how the lens model and graphic representation were employed to externalize aspects of cognition that are normally covert, thus diminishing the impact of inconsistency.

In 1971 The Dow Chemical Company saw a bitter three-month strike. Management and union both agreed to a reenactment of the strike in the hope that new techniques of negotiation might be developed that might in the future help avert such chaos. All seven of the original negotiators from each side agreed to participate in the reenactment. Three from each side were selected to participate and were subsequently treated as three pairs. The participants, who knew each other well, included the two chief negotiators and the most influential member of each side. They agreed that there were four key issues that had been involved in the original negotiations and would be involved in the reenactment. The four issues were: 1. Duration of the contract in years, 2. wage increase in percent, 3. Number and use of operators, and 4. Number of strikers to be recalled. There were 5 levels of each possible contract, resulting in a total of 625 possible contracts, from which 25 were selected randomly to present to the negotiators. The possible contracts were presented and judges' responses recorded on a computer. The negotiators made evaluations of the contracts on a 7-point scale ranging from recommend rejection to recommend acceptance. Negotiators also provided subjective weights concerning their own policy and that of a counterpart on the other side.

Relative weight on issues, which are normally covert aspects of cognition, were externalized on a computer graphics display, as were the function forms derived from the regression analyses. In much judgment analysis research linear relations are assumed, but in labor management issues some function forms are non-linear. After such graphic feedback was given to two of the paired negotiators, all three pairs of negotiators rated the 25 contracts again, then entered a negotiation phase in which each pair was instructed to come to agreement on an evaluation of each of the 25 contracts.

We leave it up to the reader who may not have read the original paper, which is a classic in the SJT literature, to imagine the rich sets of comparisons within individuals, within the judges on a given side and between sides. Significantly, negotiators' self-reported weights did not match very closely the weights they had put on the issues. Similarly, understanding of the other, that is, the counterpart in the negotiation, was poor. *"The negotiators were confident that they understood their counterpart's policies, a belief based on years of association and negotiation. They were wrong"* (p. 320).

Balke, Hammond and Meyer concluded that "... the theory and technique described here may be useful for union-management negotiation and mediation proceedings." We concur.

Group Process

KSS describe a number of problems that can limit the effectiveness of decision-making groups. They stress the importance of having group members make independent judgments and point out that the average of independent judgments usually outperforms the results of group process. They prescribe the use of a “noise audit” to assess the extent of disagreement and a “decision observer” to help the group identify possible process problems and avoid them. Clearly these steps should improve the quality of group work.

SJT adds a powerful technique based on Hammond’s cognitive conflict model. SJT research and practical applications have shown that JA can be used in many group situations to help participants understand the reasons for disagreement and focus discussion and group work to resolve them. We provide an illustrative example of that technique.

U.S. Federal Motor Carrier Safety Administration

The U.S. Federal Motor Carrier Safety Administration (FMCSA), established in 2000, is responsible for enforcing safety regulations that apply to commercial vehicles and trucking companies. Initially their federal investigators conducted audits of companies to identify violations and determined fines based on their best judgment. After a few years of operation, they observed that identical violations could be subject to different fines depending on where in the U.S. they occurred and which Investigators determined the fines. Even if national trucking companies did not draw attention to the discrepancies, this would be a major problem to the agency.

FMCSA chose to address this problem directly through a series of meetings facilitated by a team (including one of us) versed in SJT. An initial meeting, focused on safety violations, was convened in March 2005 and included federal investigators from all regions of the U.S. In the early stages of the project, the facilitating team used a procedure very similar to the “Noise Audit” described by KSS. As recommended by KSS, participants independently judged appropriate fines for a number of cases that were represented by different levels on legislatively mandated criteria (such as culpability and history of prior conduct). But, in an additional step, the resulting judgments were analyzed (using JA) to obtain a judgment policy equation for each participant. Then participants were shown not only the (surprising, to them) extent of their disagreement, but the (unknown, to them) underlying differences in criteria weights (cue utilization) that created that disagreement.

Subsequent facilitated discussion could then focus constructively on the honest differences of opinion that resulted in disagreement. Through several iterations, including field testing, participants were able to develop a consensus model. That model was incorporated into the Uniform Fine Assessment system (UFA, FMCSA, 2021) that was distributed on laptops to all federal investigators. Based on the success of the initial meetings, subsequent meetings were held to develop consensus models for other violation types (household goods, hazardous materials, record keeping).

Similar methods have been used in projects at the NYS Office of Mental Health, the US Department of Transportation, the Texas Office of Children and Families, Albany Medical Center, the NYS Public Employee Relations Board, the NYS Division of Alcoholism, the NYS Temporary

Commission on Returnable Beverage Containers, and the National Oceanic and Atmospheric Administration. In each case, the approach was to identify the cues and cue ranges, ask individual participants to make their own judgments regarding hypothetical (or real) cases, provide cognitive feedback to each person, lead discussion of the apparent differences in their weights and function forms, ask the group to specify a shared policy, make judgments of new cases and receive case-by-case feedback about how the specified policy would predict, provide cognitive feedback from the new judgments relative to the specified policy, and repeat this process if necessary until group judgments and predicted judgments converged. In a laboratory study, Reagan-Cirincione (1994) showed that small groups using this technique could outperform their most capable member (a very high bar in group process research). She concluded “*The findings suggest that Group Decision Support Systems that integrate facilitation, social judgment analysis, and information technology should be used to improve the accuracy of group judgment.*” (p. 246)

Conclusions

Research and application have shown that cognitive conflict can lead to disagreements among experts that are difficult to resolve, and that using judgment analysis to expose differences in judgment policies so that they can be openly discussed can help resolve those disagreements. Although SJT researchers don’t often use the term “noise,” our concern with inconsistency of judgment (KSS: occasion noise) and disagreement among experts (KSS: noise) spans nearly seven decades and countless published works. We not only recognize the existence and importance of noise, in the sense that KSS use it, but we have made extensive use of methods for studying it and addressing the problem in applied settings.

The aim of SJT is both to increase understanding and to solve problems involving judgment, interpersonal learning, and disagreement. We believe that KSS missed an opportunity to allow readers to learn about a program of research rich in ideas quite relevant to the purpose of their book. SJT focuses on uncertainty and inconsistency, which exist in physical and social environments, as well as in people’s minds. The LME more than simply complements noise equations in the KSS book. It offers a quantitative way to represent all aspects of noise in interpersonal as well as task/environmental relationships. Examples of research reveal the usefulness of judgment analysis methodology and the LME in discovering important aspects of judgment insight and agreement.

We will close by reminding the reader of the words of Paul Slovic and Sarah Lichtenstein in their classic 1973 paper comparing approaches to judgment research.

Several research paradigms have been wound up around common points of interest and are chugging rapidly down diverging roads. Since any study almost always raises additional questions for investigation, there has been no dearth of interesting problems to fuel these research vehicles. Unfortunately, these vehicles lack side windows, and few investigators are looking far enough to the left or right. Of several hundred studies, only a handful indicate any awareness of the existence of comparable research under another paradigm. The fact remains, however, that all these investigators are interested in the same general problem--that of understanding how humans integrate fallible information to produce a judgment or decision. (p. 90)

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