OKJDM – 2018

Oklahoma-Kansas Judgment & Decision Making Workshop

Saturday, April 28th, 2018 – Kansas State University

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MEETING LOCATION:
4th Floor Executive Conference Room, Business Building, Kansas State University
1001 Business Building, Kansas State University, Manhattan, KS 66506
About OKJDM
Following the national expansion of the Society for Judgment and Decision Making (Founded in 1986, with Jim Shanteau as the first president), Shanteau and others decided that they would like to institute a more local, more informal annual meeting. The first Oklahoma/Kansas Judgment and Decision Making meeting was held in 1989, and OKJDM has stayed true to this format for over more than 25 years. The annual OK JDM workshop provides a friendly, multidisciplinary forum facilitating collaborative Decision Science and Human Performance research and development. The one day workshop historically takes place either in Kansas or Oklahoma, bringing together diverse practitioners, professionals, and students from the broader region (e.g., Texas, New Mexico, Nebraska, Arkansas, Louisiana). The workshop is open to all interested participants and qualified presenters. Although there is no set format, in recent years the workshop has included 10-20 research presentations, a research poster session, a panel discussion, and an informal social event after the conference. Registration is free. Lunch and simple refreshments (including coffee) will be provided by sponsors.

Organizing Committee
Larry Bailey, Federal Aviation Administration
Gary Brase, Kansas State University
Edward T. Cokely, University of Oklahoma
Robert Hamm, University of Oklahoma Health Science Campus
Madhuri Ramasubramanian, University of Oklahoma [Grad Student Representative]

Sponsors
The University of Oklahoma, National Institute for Risk & Resilience
Department of Psychological Sciences, Kansas State University
WORKSHOP MASTER SCHEDULE – APRIL 28th 2018

9:00-9:40 am  Check-in, Introductions, & Coffee (posters may be put up, if desired)
                 Opening Address by Gary Brase, Kansas State University
                 Faculty / Professional Q & A Roundtable (see below)

9:40-11:00 am  Session #1 Modeling and Measuring Judgments & Decision Making
                 Harman - Dynamic Sunk Costs: Importance matters when opportunity costs are explicit
                 Brandner, et al. – Good things come to those who “weight”…
                 Vangsness & Young – Central and Peripheral Cues to Difficulty in a Dynamic Task
                 Ghazal, et al. - Berlin Numeracy Component Test (BNT-C): Development & Validation

11:00-11:40 am  Coffee Break & Student/Postdoctoral Q & A Roundtable (see below)

11:40-1:00 pm  Session #2 Applied Judgments & Decision Making
                 Lake, et al. - Who is Labeled a Job-Hopper? …
                 Schafer – The Extent of Academic Research Use in Local Public Management
                 Hamm, et al. – Effect of Within-Category Cue-Cue Correlations on the Accuracy…
                 Papa & Parikh - Exploring the knowledge base structures enabling physicians…

1:00 -2:30 pm  Lunch & Poster Presentations

2:40-4:00 pm  Session #3 Information presentation in Judgments & Decision Making
                 Shanteau - JDM Researcher vs Transplant Surgeon: Guess Who Won?
                 Stevens & Duque – Order Matters: Alphabetizing In-Text Citations Biases Citation…
                 Brase - The implications of individual differences for Bayesian reasoning: …
                 Zhang & Harman - Alternative Effect Size Presentations and Confidence Judgments: …

4:00-4:30 pm  OKJDM 2019 plans, pictures, & wrap-up

Faculty/Professional Q&A
Pick two of the following questions and briefly tell everyone your answer:
  a) What research have you done that you are really proud of, but has not (yet) had the impact you hoped?
  b) What would be the single most effective change in JDM research to ensure replicability?
  c) What are two things you should have (or should not have) done in graduate school?
  d) What do you want to learn more about (or are currently working on learning); people attending who know this topic, raise your hands

Student/Postdoctoral Q&A
Pick one of the following questions and briefly tell everyone your answer:
  a) What would you like to be doing five years from now?
  b) What do you think are the greatest challenges graduate students have today?
  c) What would be the single most effective change in JDM research to help student researchers?
  d) What do you want to learn more about (or are currently working on learning); people attending who know this topic, raise your hands
Dynamic Sunk Costs: Importance matters when opportunity costs are explicit.
Jason L. Harman (Louisiana State University)
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The sunk cost fallacy is a well-established phenomenon where decision makers continue to commit resources to an objective because of previously committed resources, even when they have knowledge that returns on their investment will not outweigh their investment. Most research on the sunk cost fallacy is done using hypothetical scenarios where participants make a single decision to continue with a project or to abandon it. This paradigm has several limitations and has resulted in a relatively limited understanding sunk cost behavior. To address some of these limitations, we created a dynamic repeated choice paradigm where sunk costs are learned over time and opportunity costs are explicit. Over three experiments we show that the sunk cost fallacy depends on the relative a priori importance of the goal being invested in. We observed escalation of commitment only when the sunk cost domain is more important than alternatives (explicit opportunity costs), and participants showed de-escalation of commitment to the sunk costs domain otherwise.

Good things come to those who “weight”: Comparison of trait integration methods
Jordann Brandner, Sydni A. J. Huxman, & Gary L. Brase (Kansas State University)
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Previous mate preferences and choice research has tended to focus on either analyzing discrete traits which contribute to assessment of potential mates or the effects of holistic mate value on decisions. Only recently has research turned to the issue of how individual traits are integrated into overall mate value assessments. Many integration methods have been proposed, including Euclidean distance algorithms, threshold models, aspiration models, non-compensatory heuristics, correlations between potential and ideal partner traits, and weighted additive models. The present study involved 108 undergraduate participants, who completed a series of 100 two-alternative choices, indicating which of two profiles were most attractive. They then reported the relative importance, ideal values, and minimum values of eight continuous traits (which were randomly varied in the prior profiles). Predicted decisions were generated for nine different integration strategies, using participants’ individual cue evaluations. Accuracies of the predicted decisions were compared using nine multilevel logistic regressions, which showed that a weighted additive strategy better described actual decisions than any other proposed integration model, including Euclidean distance models.

Central and Peripheral Cues to Difficulty in a Dynamic Task
Lisa Vangsness & Michael Young (Kansas State University)
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This experiment tested competing hypotheses about the cues involved in making judgments of difficulty (JODs). Theoretical approaches have identified five cues that underlie peoples’ judgments of difficulty (JODs). However, methodological and statistical challenges have concealed the nature of this relationship. We designed a videogame task that tested the degree to which time-on-task, performance-based feedback, and task-centric cues informed JODs. These relationships were modeled along five continuous dimensions of difficulty. Task-centric cues most strongly contributed to JODs; judgments were also supplemented by peripheral cues (performance-based feedback and time-in-level), even though they were not always valid. Additionally, participants became more likely to rate the game as “easier” over time. Understanding the functional relationship between cues to difficulty and JODs can improve products that use task-peripheral cues (e.g., driver-assistance systems) and enhance performance impacted by JODs (e.g., learning).
**Berlin Numeracy Component Test (BNT-C): Development and Validation**
Saima Ghazal (University of the Punjab, Pakistan & University of Oklahoma), Jinan N. Allan, & Edward T. Cokely (University of Oklahoma)
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Numeracy—i.e., one’s practical understanding of mathematics in context—is one of the strongest predictors of general decision making skill. Despite notable scientific progress on the nature of numeracy and decision making, cognitive and decision sciences have yet to investigate individual differences in numeracy components (e.g., algebra versus probability). In this paper, we report on our efforts to develop new measurement technology and quantitative models of cognitive and decision skills. Analyses include the first known investigations of the relations between major adult component numeracy skills and general decision making. Specifically, we used an established theoretical framework from adult education and two-parameter logistic IRT models to create the Berlin Numeracy Components Test (BNT-C) for college educated samples. Behavioral and analytic results indicated that the test efficiently measured full-scale adult numeracy and component numeracy skills (i.e. operations, probability, geometry, and algebra), with superior psychometric performance (e.g., difficulty, discriminability, and sensitivity). The BNT-C was further validated using data from one of the most integrative studies of cognitive abilities, i.e. study 2 of the 5 year Risk literacy Components Study (riskliteracy.org), including data from 500 young adult participants who completed a five hour assessment battery over course of 5-12 weeks. Predictive modeling of behavioral data revealed that with few exceptions the BNT-C explained all types of decision skill better than any other individual ability assessment (e.g., intelligence v. impulsivity v. other numeracy tests). The BNT-C additionally outperformed the optimal linear combination of all combined ability tests when predicting overall general decision making skill, a finding that is consistent with a causal cognitive account of the relations between numeracy and general decision making skill.

Component analyses indicated that operations and probability skills were robustly and uniquely tied to risk literacy and to nearly all general decision making sub-skill competencies independent of the influence of other cognitive abilities (e.g., intelligence). Discussion focuses on theoretical implications and factor analytic modeling of the relations between numeracy, its component skills, and superior decision making.

**Who is Labeled a Job-Hopper? Hiring Managers’ Evaluations of Job Applicant Work Histories**
Christopher J. Lake, C. Warren, R. Ryan, M. Griffis, T. Hofeling, N.M. Voss, C. Chlevin, & L. Fossum (Kansas State University)
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Organizations and their agents (e.g., human resources officers) are concerned about the increasing frequency with which people are changing jobs. One way an organization reduces the risk of worker turnover is by screening out “job-hoppers” during the application review process. Although it is clear that this screening occurs, it is not yet clear who, exactly, is being screened out. Preliminary evidence from a number of expert groups (e.g., career counselors, human resources professionals) suggests that workers who change jobs once or more per year are labeled job-hoppers. The goal of the current study is to validate this preliminary definition of job-hopping and determine the extent to which the definition generalizes to the hiring process. Using the policy-capturing paradigm, approximately 50 hiring managers (data collection currently in progress) were shown experimentally-manipulated work history data from several job applicants. To ensure that work history variables emulated values found on real job applications, we randomly sampled and recorded job history data from 3,000 real job applications. The primary independent variables were: number of jobs held (1, 2, 4, 8, 16), mean tenure (3 months, 6 months, 1 year, 2 years, 5 years), and variability of job tenure (low, high). A stimulus sampling approach was interwoven into the design such that, for any of the 50 experimental conditions, a participant would see one of four randomly-presented job applications. Thus, of 200 total applications that were generated, each participant was shown a random subset of 50. After a short practice session, the hiring managers were presented their 50 resumes in randomized order. For each job application, hiring managers provided their perceptions about the applicant’s job change frequency and hireability. Hiring managers further predicted how long each applicant would stay with the organization if they were hired. Following typical
policy-capturing analysis procedures, regression will be used to evaluate the weight that hiring managers place on each of the cues (number of jobs, mean tenure, variability, applicant sex, trajectory of changes, maximum- and minimum-tenure values), thereby gaining an enhanced understanding of how job-hopping judgments are formed. Results will be interpreted and discussed with particular attention paid to the implications for workers and organizations.

The Extent of Academic Research Use in Local Public Management
Josephine Gatti Schafer (Kansas State University)
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This research explores the extent of evidence-based decision-making and management among local government managers. An online survey was sent to local public managers in March of 2018. The survey instrument was based on previous surveys of evidence-based management applied in the public health sector. To date, no similar survey has been done of local public managers in the United States. Preliminary results of the survey will be presented as well as some possible explanations for the application of evidence based management in local government.

Effect of Within-Category Cue-Cue Correlations on the Accuracy of Relative Weight Measures in Logistic Lens Model Analyses
Robert M. Hamm (University of Oklahoma Health Sciences Center), Esther Kaufmann (University of Zurich), Emmanuel Bottieau (Institute of Tropical Medicine, Antwerp), & Jef Van den Ende (Institute of Tropical Medicine, Antwerp)
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In the Brunswik lens model, the same form of equation is used to describe the relation of an environmental fact to cues, and to describe the relation of a judgment (a guess about that fact) to the same cues. When the fact is a yes/no category, and the judgment is the same, then logistic regression is an appropriate modeling technique. In some environments, the category of interest is rare, so the judgment researcher will boost the proportion of the rare category in the stimulus set, so the judge is not overburdened with a huge number of “nope” judgments. In many environments, cues are correlated with each other. Sometimes the judgment researcher will make the cues be uncorrelated, in the stimulus set, because it makes it easier to fit models unambiguously. Do these innocent modifications of the stimulus set, which make it different than the ecology to which one would want to generalize the results, make any difference to the models? In the context of the logistic lens model equation, we explored the joint effects of within-category cue-cue correlations and of changing the proportion of stimuli with each category, using a data base of patients with fever. We focused on the ecology model. In a diagnosis task, any particular disease category will be a small minority of patients; and the symptoms are often correlated with each other. We’ll show differences in cue-cue correlations among the patients with versus without a disease. We’ll show the effects upon the regression coefficients of varying the proportion of stimulus patients with the disease category, and apportion these effects between category proportions and cue-cue correlations. The audience may decide to be more cautious about how they structure their stimulus sets.

Exploring the knowledge base structures enabling physicians to perform differential diagnosis in accordance with Dual Processing Theory
Frank J Papa & Tiraj Parikh (University of North Texas Health Science Center)
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Dual Processing Theory (DPT) represents the Learning Sciences current understating of how humans perform categorization tasks such as differential diagnosis (DDX). DPT suggests that there are two distinct yet interrelated cognitive systems (termed System 1 and System 2) enabling categorization. Further, each system is theorized as consisting of two distinct components: 1) the information processing mechanism(s) characteristic of, and used by, the given system, and 2) the knowledge specifically organized/structured to support each system’s characteristic information processing mechanism(s).
System 1’s information processing mechanism has been characterized as a rapid, reflexive/autonomous, pattern recognition/similarity-oriented approach to categorization, while System 2 is said to support a slower, conscious/deliberate, analytically-based approach. For several decades, researchers have demonstrated that performance in a categorization task is much more heavily dependent upon the given System’s knowledge rather than upon its information processing mechanism. For example, the ability to determine the specific categorical cause of: 1) a car not starting (e.g., dead battery, empty fuel tank, fuel pump failure, etc.), 2) a patient’s “acute chest pain” (e.g., heart attack, pneumonia, pulmonary embolus, etc.), 3) an air conditioner not cooling a home (e.g., loss of coolant, tripped circuit box, obstructed air filter, etc.) is much more dependent upon whether the problem solver has knowledge of the common/important categorical causes of the problem at hand rather than the information processing mechanism(s) recruited to solve the problem (i.e., System 1’s pattern recognition/similarity-oriented mechanism(s) or System 2’s analytically mechanism(s).

This presentation describes how each system utilizes two distinct forms of knowledge to perform the categorization task of DDX. That is, a description of how System 1 uses knowledge in the form of: 1) disease case “exemplars” and 2) disease Prototypes to perform DDX via its inherent pattern recognition/similarity-oriented information processing mechanism(s), while System 2 uses knowledge in the form of 3) biomedical mechanisms/rules, and 4) statistically based disease by feature frequency associations to perform DDX via analytically-oriented information processing mechanism(s).

**JDM Researcher vs Transplant Surgeon: Guess Who Won?**
James Shanteau (Kansas State University)
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This paper is based, first, on a study of willingness to donate organs under various conditions: (a) whether the donor is alive or deceased, (b) relation of recipient to donor, (c) what organ is to be donated, and (4) prior commitment to be an organ donor. Results from two experiments with 380 participants revealed greater willingness to give to relatives while living and to strangers after death. Surprisingly, those least willing to make a prior commitment, i.e., “anti-donors”, are willing to donate organs to relatives. Thus, they were anti-stranger rather than anti-donor. The second part of this paper describes what happened when the author was scheduled to present these results at a meeting of the Federal Advisory Committee on Organ Transplantation (ACOT). The committee consists primarily of transplant surgeons, although others involved in organ transplantation are also included (such as Larry Hagman, who received a liver transplant). Because of media coverage of Mr. Hagman, a transplant surgeon preempted the speaking time allocated for presentation of the author’s study. Lesson 1: never stand between a surgeon (or politician) and a TV camera; for them, media coverage is everything. Lesson 2: scientific evidence may be used when it supports pre-existing opinions; otherwise, it is ignored. Lesson 3: research results can be revealing about behavioral resistance to life-saving medical procedures— if Doctors are willing to listen.

**Order Matters: Alphabetizing In-Text Citations Biases Citation Rates**
Jeff Stevens & Juan Duque (University of Nebraska-Lincoln)
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Though citations are critical for communicating science and evaluating scholarly success, properties unrelated to the quality of the work –such as cognitive biases – can influence citation decisions. The primacy effect, in particular, is relevant to lists, which for in-text citations could result in citations earlier in the list receiving more attention than those later in the list. Therefore, the order of citations could influence which citations receive the most attention. Using a sample of 150,000 articles, we tested whether alphabetizing in-text citations biases readers into citing more often articles with first authors whose surnames begin with letters early in the alphabet. We found that surnames earlier in the alphabet were cited more often than those later in the alphabet when journals ordered citations alphabetically compared to chronologically or numerically. This effect was stronger in psychology journals (which have a culture of alphabetizing citations) compared to biology or geoscience journals (which primarily order chronologically or numerically) and was strongest among the most highly cited
articles. Therefore, alphabetizing in-text citations biases citation decisions toward authors with surnames early in the alphabet. These citation decisions result from an interaction between cognitive biases (more attention devoted to items earlier in a list) and the structure of the citation environment (the style in which citations are ordered). We suggest that journals using alphabetically ordered citations switch to chronological ordering to minimize this alphabetical citation bias.

The implications of individual differences for Bayesian reasoning: Is performance driven by task engagement, nested sets models, or numeracy and visuospatial ability?
Gary L. Brase (Kansas State University)
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Several means now exist to present Bayesian reasoning situations in ways that somewhat improve performance, and some attention has begun to turn to individual differences that can account for additional degrees of performance change. As with previous research in this area, ecological rationality and nested set / mental model views take different stances on this issue. Additionally, it is also possible that general task engagement could be a predictor of performance. By assessing Bayesian reasoning ability in conjunction with multiple individual different measures, the present research clarifies these issues. Participants’ (n=304) Bayesian reasoning was best predicted by measures of numerical literacy and visuospatial ability, as opposed to a measure of general task engagement or measures of nested sets / mental models thinking abilities. There was also some predictive ability for the Cognitive Reflection Task, which was only partially due to the numeracy aspects of that instrument. These results clearly support an ecological rationality view of Bayesian reasoning, rather than a nested sets / mental models view

Alternative Effect Size Presentations and Confidence Judgments: A Lens Modeling Perspective
Don Zhang & Jason Harman (Louisiana State University)
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Recent research has found that alternative effect size statistics such as the Binomial Effect Size Display (BESD) and expectancy charts are easier to understand for a lay audience than traditional effect size statistics such as the Pearson’s correlation coefficient. Brooks et al. (2014) found that lay people judged the BESD to be higher in understandability and usefulness when compared with traditional effect sizes. They also found that the utility of an intervention was judged to be greater when the effect size was communicated with a BESD than with the correlation coefficient. However, individual perceptions of comprehension are subject to biases and do not always represent true accuracy of comprehension. In this study, we examine confidence calibration as an objective measure of one’s judgment accuracy of effect size. Using a Lens Modeling approach, we also examine the effect of presentation mode on cue utilization. We presented participants with a series of bicycle race predictions. In each trial, participants are presented with a hypothetical racer and his/her score on an endurance or strength assessment. The participants were told that strength (endurance) is associated with race performance. The association between strength (endurance) and race performance is represented either as a correlation (r = .3 for strength and r = .7 for endurance); a mathematical equivalent BESD; or an Expectancy Chart. For each trial, the participant is told to indicate how likely (0 to 100%) that the racer will qualify for the race. The racer’s actual performance was determined by a computer simulation based on pre-defined correlations. We found that participants who were presented with the validity as BESD or Expectancy Chart performed significantly better than those who were presented with a simple correlation. Specifically, people who saw the expectancy had better confidence calibration measured by Brier Scores and higher resolution, which is measured as proportion of correct predictions. The presentation of expectancy chart also reduced people’s overconfidence. Using a Lens Modeling approach, we also found that people who were presented with an alternative effect size (BSE and Expectancy Chart) had greater cue utilization of the attribute in their predictions.
Numeracy vs. Intelligence: A Model of General Decision Making Skill
Jinan Allan (University of Oklahoma), Saima Ghazal (OU & University of the Punjab), Adam Feltz (Michigan Technological University), Rocio Garcia-Retamero (Universidad de Granada), Edward T. Cokely (OU)
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For nearly 150 years, psychological research and theory has documented a link between general intelligence and decision making performance. This suggests that individual differences in decision making (and other life outcomes --e.g., health, wealth, and happiness) may primary follow from individual differences in heritable and relatively stable domain-general cognitive capacities, commonly assessed with fluid intelligence. However, over the past 40 years there have been great developments in decision making measurement and theory. These developments allow for more precise and comprehensive assessments of essential judgment and decision making tasks which have traditionally been neglected in research on general intelligence. Recent research further indicates that the influence of statistical numeracy (e.g., practical probabilistic math skills) on decision making skill tends to be far greater than that of fluid intelligence or other general cognitive abilities (Cokely et al., 2012; Ghazal, 2014). Here we report results from one of the most comprehensive studies of cognitive abilities and decision making skill, including data from 300 participants who completed a five hour assessment battery. Using confirmatory factor analysis and structural equation modeling, we present a new model of general decision making skill where numeracy mediates the relationship between intelligence and decision making skill. Discussion focuses on implications for a refined factor structure of human cognitive abilities and related applications (e.g., adaptive training, risk communications).

Cybersecurity Risk Literacy: Phishing Decision Vulnerability
Jinhyo Cho (University of Oklahoma), Adam Feltz (Michigan Tech University), Abigail Kuehne (Michigan Tech University), Jinhyo Cho (OU), & Edward T. Cokely (OU)
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As technology develops, cybersecurity threats (e.g., hacking, ransomware, phishing etc.) pose increasing risks to individuals and organizations. To begin contributing to the behavioral science of cyber threats, we developed instruments that might predict an individual's vulnerability to phishing and investigate relations among factors that predict Phishing decision vulnerability. By developing brief and efficient instruments, it aims to make a contribution to predicting decision quality in phishing.

Dollars and cents: How currency affects decision making
Tyler Cully & Jeffrey Stevens (University of Nebraska, Lincoln)
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Stevens (2016) found that similarity judgements may be the key mechanism driving inter-temporal choice. This study sough to replicate these findings, as well as to explore how type of currency (dollars vs cents) may affect similarity judgments, and in turn, inter-temporal choices. The research question was: Does framing amount similarity judgements as dollars compared to cents, make people (1) judge them as more similar and (2) choose small, sooner options more? Participants (N=142) were randomly assigned to either the dollar group monetary values were in “X dollars” or the cents group “X Cents”). Participants then answered a series of questions, including: Inter-temporal choice (Which would you rather receive: 6 dollars in 10 days or 9 dollars in 14 days?). Amount similarity (Do you consider 6 dollars and 9 dollars to be similar or dissimilar?). Delay similarity (Do you consider 10 days and 14 days in the similar or dissimilar?). Framing the reward amount as dollars or cents influenced both similarity judgments and inter-temporal choices, but it is not clear that this happened in the way predicted.
The Influence of Priming, Nudging, and Information Provision on Pro-Environmental Behavior
Raleigh Goodwin & Jason Harman (Louisiana State University)
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The problem of coastal land loss has plagued the state of Louisiana for over a century, yet many of its citizens do not grasp the significance of the problem. In the current study, five methods of presenting the problem were developed based on theories and findings from psychology and behavioral economics. These methods will be tested to see which, if any, have a significant effect on promoting productive pro-environmental attitudes and behavior in participants. Approximately 200 LSU psychology students will complete the online experiment that measures their attitudes on coastal erosion, provides them with general and condition-specific information about the issue, and gives them two opportunities to engage in pro-environmental behavior.

Conceptual and Procedural Knowledge in Numeracy, but not other General Cognitive Abilities
J. Chase Hood & Gary L. Brase (Kansas State University)
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Schools are increasingly encouraged to prepare students for careers in the areas of science, technology, engineering, and mathematics (STEM), where an increasing number of jobs are anticipated. However, the U.S. has fallen behind many countries in competitive scientists trained per capita. To mitigate this issue, advances in educational practices are needed, including in the area of mathematics. Although there is an active literature on the development of mathematical abilities in children, little analogous work has been done with adults. The present research therefore is aimed at expanding upon our theoretical understanding, measurement, and education of mathematical abilities across the lifespan. To investigate how general mental abilities (GMA) known to correlate with mathematical abilities co-vary with each other and fit within current models of mathematical cognition, participants (N = 235) completed a series of GMA tests as well as two popular numeracy measures. Exploratory factor analyses indicated that GMA and numeracy were related yet distinct from each other. Additionally, when numeracy items were analyzed separately, a two-factor model best explained the data, with the factors seeming to correspond to a “conceptual” factor and a “procedural” factor, which mirrors the evidence from the mathematical developmental literature.

Friends with potential benefits: Exploring the relationships between mate value, sex, and backup mates
Sydni Huxman, Jordann L. Brandner & Gary L. Brase (Kansas State University)
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An important but understudied aspect of the mate switching hypothesis is the use of a backup mate as part of a mating strategy. Some features of the backup mating aspect, such as the average number of backup mates (~3 per participant), have been documented, but other features, such as individual differences, have been evaluated less thoroughly. In these studies, we examine the effects of mate value, sex, and attachment style on number of backup mates. We hypothesized that backup mates should have a lower mate value than participants’ current partners, because otherwise participants should theoretically mate switch. Additionally, we have competing hypotheses about which sex should have more backup mates. Finally, we explore the relationship between individual attachment style and number of backup mates, and hypothesize that those with anxious attachment styles should have more backup mates due to a general anxiety about their current partner leaving them. These effects are studied using both a college sample and an mTurk sample. Results indicate that the number of backup mates being used in the college sample is much lower than previous studies have reported. Where backup mates were being employed, we did find theoretically predicted patterns: 1) females were more likely to employ backup mating as a strategy and 2) individual differences in both mate value and attachment style are related to the use of backup mating as a mating strategy. This study has important implications for both the backup mating hypothesis and the mate switching hypothesis, such that individual differences in self-perceived mate value, partner mate value, and backup mate value as well as attachment style are all related to the utilization of backup mating.
Are mating strategies shaped by foraging strategies? Individual differences associated with decisions to explore versus exploit dating pools
Katherine Kolze, Gary L. Brase, & Jordann L. Brandner (Kansas State University)
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Previous research suggests that the exploration/exploitation tradeoff in foraging theory can be applied not only to the literal, external environment, but also to internal environments (memory, etc.) and virtual environments (internet searches, etc.). Applying this to the domain of mate search, the present study predicted that greater exploitation (i.e., more thorough examination of options) should be associated with being female, having a long-term mating strategy, and having a slow life history strategy. Mate value and HEXACO traits were also included for comparisons. Previously found correlations across these measures generally replicated, and a novel measure of exploration/exploitation tendency in mating contexts was also correlated with some of these measures. Search strategy correlated largely as predicted with mating orientation, mate value, life history strategy, and sex, but it was significantly predicted specifically by mating orientation and mate value (along with emotionality). Given the increasing use of technology such as dating applications with profile databases, research on how mate search occurs in such environments is of growing importance.

Examining Effects of Question Format and Dimensionality on Numeric Estimation Errors and its Relation to Numeracy
Yuhang (Doris) Ma, J. Chase Hood, & Gary L. Brase (Kansas State University)
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An interesting developmental pattern in children’s mathematical abilities can be seen in their representation of the mental number line. Children shift from an intuitive logarithmic representation of quantity to a (correct) linear representation, making this shift with progressively larger numbers as they get older. This is demonstrated by children’s achievement in mathematics education and their ability to accurately map increasingly larger magnitudes onto linear space (e.g., in a line-bisection task). Additional work has demonstrated that mathematics ability is related to numeracy (one’s ability to understand and manipulate probabilities and statistics), and one purpose of this work is to provide additional insights into how mental number line understanding relates with numerical ability. A second purpose of this work is to evaluate some gaps in the literature regarding how one measures participant’s understanding of the mental number line. Specifically, the same question about number lines can be asked in multiple formats. Although it is assumed that performance is unaffected by question format, this has not been tested empirically and the results could potentially help to clarify some disparities in the current literature. A third purpose of this work is to extend research on mathematical abilities by adding dimensions to the number line task. The mental number line has been conceptualized and tested along one spatial dimension (e.g., left to right). However, when judging quantities, a more verisimilar task would involve estimations of two or three dimensions; i.e., estimates of area or volume, respectively. Participants were asked to estimate quantities in two-dimensional space, using tasks analogous to those a number line in one-dimensional space. The relationships between numeracy, standard number line estimates (in different formats), and two-dimensional quantity estimation questions are discussed in terms of theoretical implications. These results are also discussed in terms of how they could be applied to education in such a way as to benefit both personal and societal goals.

Here’s a Tip: How Baristas Nudge us into Tipping More
Alexandria Pytlik Zillig & Jeffrey R. Stevens (University of Nebraska-Lincoln)
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Though factors that influence tipping have been studied (Seiter, 2007 and Gueguen & Jacob, 2011), little research has investigated how the presence of tip screens impact behaviors and attitudes towards tipping. Nudge theory predicts that when participants are prompted with a tip screen, they will tip more. We also predicted that the presence of a barista would increase tipping because of social facilitation (Bateson, 2006). Finally, we hypothesized that participants would feel more negative towards tip screens than tip jars, and they
would therefore try to avoid the screens when possible. For our study we conducted a 2 (barista present/absent) X 2 (tip screen/ no tip screen) within subjects experiment. We told participants to imagine they were visiting a coffeehouse and they could choose an item off a menu. Each participant was prompted with the scenarios in a randomized order. Our results did not support the hypothesis that tip screens cause people to tip more, but did support that the presence of a barista increases tipping. Additionally, participants reported feeling more negative towards tip screens, and they said they tried to avoid them more often than tip jars. The implications from our findings suggest that the presence of a barista when paying appears to be a powerful nudge, and while tip screens do not guarantee increased tipping, they are causing people to feel more uncomfortable about tipping.

Measuring General Risk Perception: Relations with Numeracy and Ideology
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Diverse US residents (1,105 M-Turk participants, 40% male) rated a broad-range of risks (UAVs, severe storms, vaccines) and completed a general Decision Making Profile inventory (e.g., numeracy, resiliency, cultural cognition, DOSPERT, personality, political ideology, demographics). Results reveal that numeracy and political ideology were the only consistent predictors or risk perceptions, including robust relations across specific and broad factor-analytically derived risk categories. Numeracy was also associated with lower overall risk ratings. Discussion focuses on implications for brief general Decision Making Profile inventories including standardization of psychometric risk perception scales and norms.

Barking up the wrong tree? An exploratory study of human-animal interaction effects on cognition
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Researchers have found that interactions with pet or therapy dogs induce psychologically and physiologically therapeutic effects on humans. These findings have ignited a spark in the presence of therapy dogs in school settings -from preschools to college campuses- despite a lack of research supporting any cognitive effects of these interactions. In this study, we aim to address this gap, exploring whether interacting with a dog can restore depleted cognitive resources. To address this question, we compared results from a battery of cognitive tests in participants experiencing either animal interaction or sitting quietly following a stressful arithmetic task. Preliminary data suggest a restorative effect of animal interaction on cognition. Our findings call for a more robust investigation into the cognitive benefits of animal interaction, as well as deeper consideration into the theoretical underpinnings of this line of research.

The Development and Preliminary Validation of a Career Maximizing Scale
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While the concept of maximizing has received a large amount of attention in the judgment/decision-making and career choice literatures (Dalal, Diab, Zhu, & Hwang, 2015; Iyengar, Wells, & Schwartz, 2006), there remains considerable debate regarding the meaning, benefits, and measurement of maximizing (Cheek & Schwartz, 2016; Zhu, Dalal, & Hwang, 2017). Maximizing refers to a choice strategy where one attempts to select the optimal option while satisficing refers to a choice strategy where one selects an option that is “good enough”. Recent conceptualizations of maximizing suggest that maximizing represents a generalized, trait-like tendency. People with a maximizing tendency generally have high standards, seek out alternative options, and have difficulty making decisions (cf. Dalal et al., 2015) due to their desire to make an optimal choice. While a substantial amount of research supports the notion of maximizing as a general tendency (e.g., Diab, Gillespie, & Highhouse, 2008), it is possible that the high importance of certain decisions, such as career decisions, may
cause people to make decisions in a manner that deviates from their general tendency. Thus current measures of general maximizing may not provide insights into how people make career decisions. Accordingly, we aimed to develop a maximizing scale that focused on maximizing tendencies specific to the career domain. In study 1, we conducted a series of EFAs on a preliminary set of 44 items relevant to the career maximizing construct. The results of these analyses indicated the presence a dominant primary factor. In study 2, we conducted a series of CFAs and derived a final 10-item career maximizing scale (Coefficient Alpha = .88) with adequate fit (TLI = .94, CFI = .95, RMSEA = .08). Preliminary validity evidence suggests that while career maximizing somewhat overlaps with general maximizing, they appear to be distinct constructs. The results also suggest that career maximizing is a beneficial construct as evidenced by its positive association with career decision making self-efficacy (r = .41), negative association with avoidant decision making (r = -.21), and lack of association with workplace withdrawal cognitions (r = .06). Taken as a whole, these results offer new theoretical and measurement-based contributions to the maximizing and career choice literatures.
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