# ASIC 2014

## Thirteenth Annual Summer Interdisciplinary Conference


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Delicate Arch, Arches National Park

## *ASIC 2014 at Moab Valley Inn, Moab Utah*
## *June 23, Monday - June 28, Saturday, 2014*

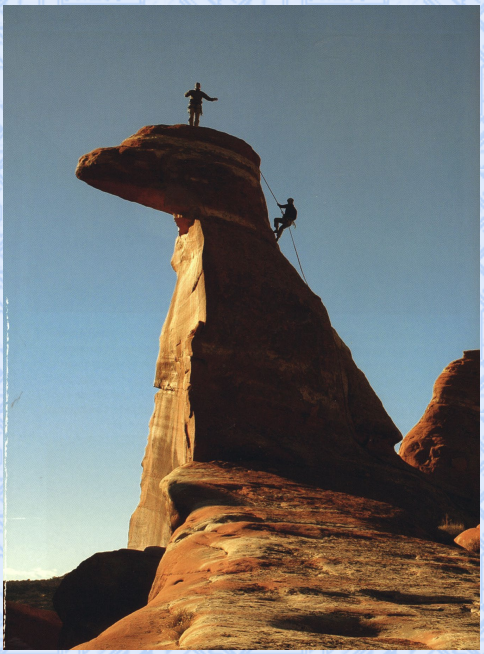
### Announcing ASIC 2014

**The Thirteenth Annual Summer Interdisciplinary Conference (ASIC 2014) will be held at the Moab Valley Inn in Moab Utah.**

**Moab is in a famously scenic part of the American Southwest, and is a center for a variety of outdoor adventures (for example, see: http://www.discovermoab.com.)**

**The dates for ASIC 2014 were chosen to take advantage of somewhat lower temperatures in the Moab area, and to prevent possible conflict with travel to the annual meetings of the Cognitive Science Society and the Society for Mathematical Psychology to be held in Quebec City in late July 2014.**

**Richard M. Shiffrin (pictured above) of Indiana University - Bloomington is the organizer: If you have not already done so and might attend ASIC 2014, please notify the organizer by email. Correspondence should be directed to**



Having fun on a typical desert tower

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## Previous Years' Websites

**Several parts of this year's website are still under construction. For examples of previous years' websites visit ASIC 2013, ASIC 2012, ASIC 2011, ASIC 2010, ASIC 2009, ASIC 2008, ASIC 2007, ASIC 2006 and ASIC 2005.**

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## Invitation

**The conference is open to all scholars who fit the very general theme of the conference, and their family and friends. An individual invitation is NOT needed. We encourage you to send the conference information to friends and colleagues.**

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## Conference Aims

**The conference will cover a wide range of subjects in cognitive science, including:**

- **modeling of cognition**
- **neuroscience, cognitive neuroscience**
- **psychology (including perception, psychophysics, attention, information processing, memory and cognition)**
- **computer science and artificial intelligence**
- **machine intelligence and learning**
- **methodology and statistics**
- **linguistics, psycholinguistics and computational linguistics**
- **philosophy of mind, cognitive science**

**We especially invite talks emphasizing theory, mathematical modeling, and computational modeling (including neural networks and artificial intelligence). Nonetheless, we require talks that are comprehensible and interesting to a wide scientific audience. Speakers will provide overviews of current research areas, as well as of their own recent progress.**

A slot canyon near Moab Utah ("canyoneering'):


## Conference Format

**The conference will start with registration and a reception from 15:30-16:15 on Monday, June 23. On subsequent days there are drinks and light snacks from ~15:50 - 16:15, the talk session from about 16:15- 20:00 (with a brief refreshment break midway), and then dinner.**

**There is a single speaking session each day. If the number of participants exceeds the number of 30 minute speaking slots (about 42), then the talk times will be adjusted, and/or the speakers will be chosen by the organizer. The talks each day are not organized by theme: In the spirit of interdisciplinarity, the talk topics each day will be chosen to maximize diversity. Information on submitting proposals for presentations is on the page of this website labeled 'Talk Submissions''. Please submit talk information on the website, rather than directly to the organizer.**

**It will not escape the careful reader that this conference format frees most of the day for either discussions with colleagues or various other activities with colleagues, family, and friends. We expect all scientific attendees and participants to attend all sessions. The time frame will allow day trips to nearby sites, but arrange to return in time for the sessions. Travel to sites and planned activities from which a return for the session will not be possible by 16:00 should be arranged for days preceding and following the conference.**

## Registration

**You are not officially on the request list for presenting research (talks or posters) until you send the registration fee. Instructions are on the Registration page at this website.**

## Lodging

**A block of rooms at the Moab Valley Inn are presently being held, but are limited (at the price negotiated, and unreserved rooms will gradually be returned to the general public, so**

**reserve soon. For information visit the Lodging page at this website.**

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## Registration Information for ASIC 2014

**If you are planning to attend ASIC 2014, please fill out the registration form and submit your registration fee. This year the registration fee pays not only for rental of the conference room, equipment rentals, snacks and drinks at conference breaks and the opening reception, but also for catering of breakfasts and dinners. The registration fees are therefore much higher than in previous years, but the lodging costs are much lower, so the net costs are similar.**

**This year's fee schedule, in US dollars: For conference attendees:**

| | To: Indiana Conference Bureau |
|---|---|
| Prior to Feb. 1, 2014 | $650 |
| After Feb. 1, 2014 | $750 |

**Friends and family members ( I am assuming they will eat with the group):**

| | To: Indiana Conference Bureau |
|---|---|
| Prior to Feb. 1, 2014 | $500 |
| After Feb. 1, 2014 | $600 |

**Registration and payments are made via the Indiana University Conference Bureau as indicated on the registration form.**

**If a registration payment is made, but the attendee cancels prior to May 1 the registration fee will be refunded minus a $25 handling fee. After May 1 and prior to the conference, a refund will still be made, but the handling fee will rise to $75.**

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## Submissions of Talks and Posters

**Whether or not you have already sent some of this information to the organizer by email, please provide on the link below a list of authors (with the presenter indicated), their affiliations, and emails; a title, and an abstract (limit 250 words). These may be changed later, so do not hesitate to send them as early as possible. The organizer will use these to plan the conference and organize the sessions. Please go to the submission form. Regular talks are limited to 30 minutes, a time that includes interruptions for questions, and final discussion. It would be best to plan for twenty minutes of actual speaking. The talks should be aimed not at specialists, but at a general scientific audience.**

**There is room on the program for about 42 30-minute talks. If there are more than 42 attendees wanting to present research, then the organizer will either choose some talks to be of shorter duration, or in extremity, decide which attendees will give presentations. Thus when registering and filling out the submission form, please indicate if you might be willing to 1) give a shorter talk; 2) forego giving a talk.**

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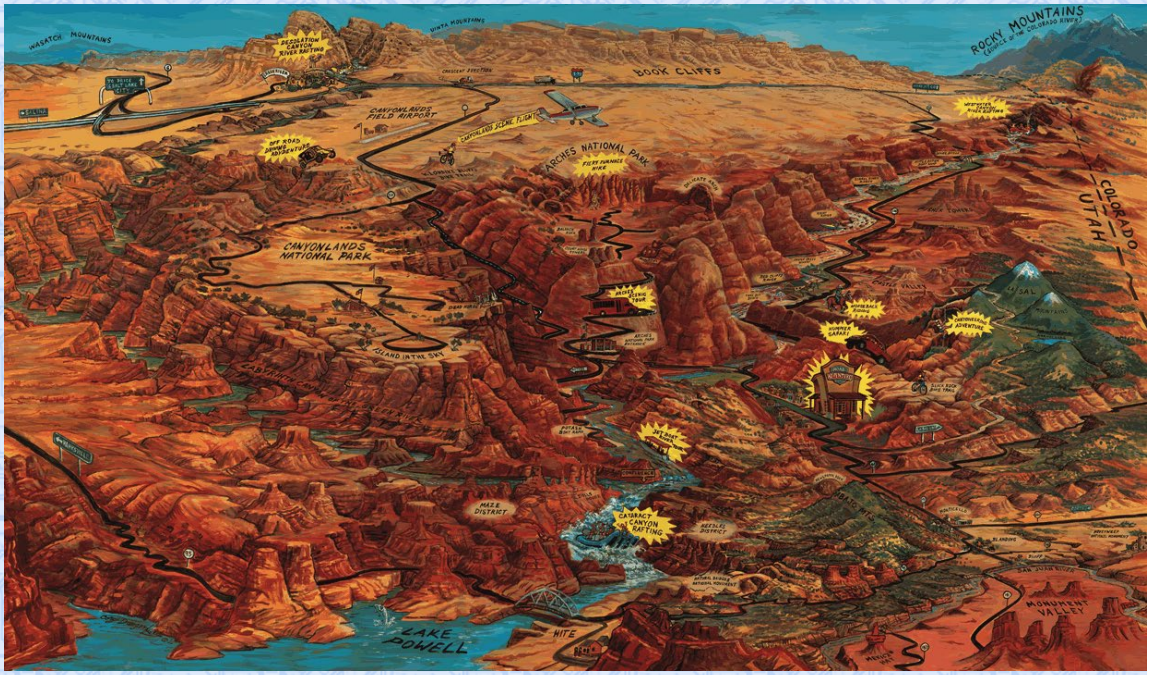
## Travel To and About
## Moab Valley Inn, Moab Utah




**For maps of the Moab area, see: http://www.moabadventurecenter.com/maps/.**

**NOTE: Those attendees with time to do so would be advised to consider flying to Las Vegas and renting a car, driving to Moab using the southern approach, via the Grand Canyon (and other sites on the same route) and returning from Moab using the northern routing, via Zion and Bryce Canyon (and other sites en route).**

## HOW TO REACH MOAB

### BY PLANE:

**See http://www.discovermoab.com/airline.htm.**

**The main airports giving access to Moab vary in distance:**

- **Moab Valley Airport, Utah -- 16 miles**
- **Grand Junction Regional Airport, Colorado -- 120 miles**
- **Salt Lake City International Airport, Utah -- 240 miles**
- **Las Vegas, Nevada -- 461 miles**

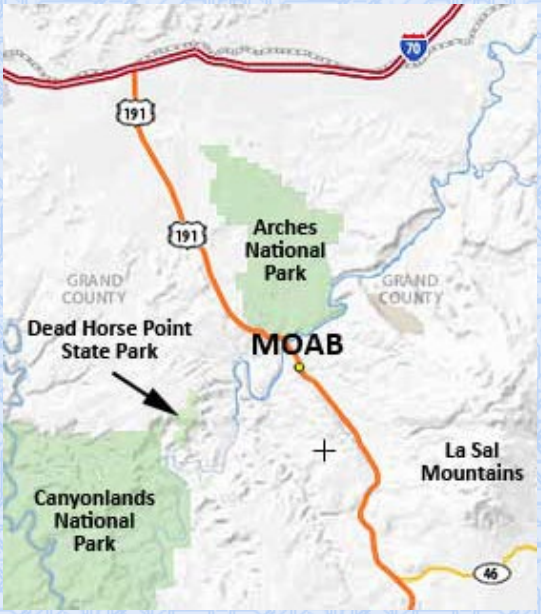
**Most attendees will fly to one of these and rent a car, partly because car rentals in this area are a good value, partly because the drives to Moab can be organized to traverse some of the most dramatic scenery of the American southwest, and partly because most of the sites worth visiting are at driving distance from Moab. Although tours from Moab to many of**

**these are readily available (see the Activities page), most attendees will find it convenient to have a rental car.**

**Las Vegas is listed partly because those with extra days prior to or after ASIC can use the drive to or from Las Vegas to visit some of the world's most dramatic parks. The more northern route, via US 15, can allow visits to Zion, Bryce, and Capital Reef National Parks. The more southern route, using state highways, can allow visits to the Grand Canyon and Lake Mead and Glen canyon National Recreation Areas.**

## BY BUS/SHUTTLE:

**See http://www.discovermoab.com/shuttle.htm.**




## BY CAR:

**US Highway 70 has an exit 30 miles north of Moab via state highway 191. (See map above). This will be the route taken by most drivers.**

## LOCAL TRANSPORT:

**See http://www.discovermoab.com/autorental.htm.**

**Although some of the spectacular local sites can be reached by regular rental cars, there are others that are best approached with special vehicles, such as four wheel drives with high clearance. These special vehicles are typically used on organized tours (see the Activities Page), but are also easy to rent locally, as indicated on the discover Moab site.**

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## Lodging

http://www.moabvalleyinn.com

**We have placed a hold on rooms sufficient for our conference needs at the Moab Valley Inn in Moab Utah at 711 S. Main St. Moab Utah 84532. The attendees must make their own reservations with the hotel (see below). The hotel website is at: www.moabvalleyinn.com.**

## Amenities

**The Moab Valley Inn has an indoor/outdoor swimming pool, hot tub, fitness center, and ample parking.**

## Lodging Prices

**Lodging rates are for rooms only. In ASIC conferences in Europe the lodging fees included breakfast and dinner, but this year breakfasts and dinners are being catered. Thus the lodging fees are correspondingly lower and the registration fees have been raised to cover the catering charges. Lodging reservations should be made as early as possible starting in the fall of 2013; ask the hotel for the ASIC conference rate.**

**Lodging Prices per room per day:**
**(regardless of numbers in room; add 13.6% tax to these prices) :**

| | |
|---|---|
| Standard Rooms (two queens or one king): | $ 99 |
| Triple Queen Rooms: | $130 |
| Suites (two queens or one king): | $125 |

**Standard and triple rooms have a refrigerator and coffee maker. Suites have the same plus a jetted tub, microwave, sink, bar and small sitting area.**

### Hotel Contact and Reservations:

Phone:
Fax:
Email:

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## Food/Dining


**We are still arranging the dining for the conference. The current plan is to have breakfasts, conference breaks, and (most) dinners catered at the Moab Valley Inn. The prices for these (and for other conference costs and services) are folded in to the attendee conference registration fee (see the Registration page on this website).**

**The Moab Valley Inn has two conference rooms, one of which will be for used for the conference presentations and the other for dining and breaks.**

**At the time of this posting, the catering is still being organized and negotiated, but the organizer will insure that the breakfasts, breaks, and dinners have the finest quality and variety available in Moab.**

**The choices for all dining will include vegetarian options. It is likely that dining will be offered buffet style, with attendees choosing their food from buffet tables. The choices will be plentiful and will vary from day to day.**

**Breakfasts will begin at 7 AM (special arrangements can be made if some activity requires an earlier start). Each day the conference will begin with light snacks and liquid refreshments from about 3:50 to 4:15, followed by talks (with a 15 minute refreshment break midway in the session), followed by dinner at about 8 or 8:15 PM.**

**The first day of the conference will have a reception from 3:30-4:15 for checking in and obtaining name badges.**

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## Climate, Weather, Clothing


Hot air ballooning near Moab

**Moab is in the American southwest on a high desert plateau (altitude 4021 ft.). It has hot and dry summer days and mild evenings. In June, the highs average 93F and the lows average 57F. There is relatively little rain, although there is the occasional afternoon and evening shower (June averages 1/2 inch of rain).**

**It would be advisable to come with sunscreen, and cool but sun protection clothing would be a good idea. Some warmer clothes for late evenings and early mornings would also be advisable. Since it can become uncomfortably hot in the sun by about noon, outdoor activities should be planned accordingly. Some people take an umbrella on hikes, for this reason.**


Moab road

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## Activities

The opportunities for outdoor activities in the summer in the Moab area are endless, and include walking, hiking, scrambling, rock climbing, canyoneering, slick rock biking, road biking, kayaking, backcountry safaris, and much more. The area has outstanding scenic beauty of quite unique and unusual character. Adjacent to Moab there are two National Parks (Arches and Canyonlands), one State Park (Deadhorse Point), and the Colorado River.

There are numerous local activity and tour agencies -- when their services are engaged they generally will provide transportation. However, a car will be advisable to access any of the activities and scenic sites arranged or visited on one's own.

### HIKING

There are numerous hikes of all lengths and difficulties in the National and State Parks and in the general area of Moab. It is very hard to find one that is not both spectacular and surreal. A few hikes are listed at: http://www.discovermoab.com/hiking.htm.

It is wise to keep in mind the need for sun protection (sun cream and appropriate clothing) and enough water for the planned outing. Temperature and sun are key considerations: Plan according to the weather forecasts and note that the days start cool but heat up dramatically in the sun, say by noon. One could consider a wide brimmed hat, sun protection clothing, and some people find it quite useful to take an umbrella. At a later date I will add more information on hiking in the area.

View from Deadhorse Point

## ROCK CLIMBING

**Alex Hannold is a world class climber who has made several commercials in the MOAB area. One is currently available at: http://www.youtube.com/watch?feature=player_embedded&v=5S-t6HWA4AQ. Alex is known for free solos (no protection), as shown in the video. Do NOT do this yourself! However the video gives a sense of the climbing and the scenery in the area.**

**Climbing around Moab is on red sandstone that varies widely in quality due to the varying hardness of the stone. Wingate sandstone is hard and supports crack climbing; Entrada sandstone is softer and rounded; Cutler sandstone is a conglomerate generally covered in 'mud' (that is scraped off by climbers putting up the standard routes: e.g. on the tallest and famous Fisher Towers) making for adventurous climbing best left to super experts. The area is nonetheless replete with high quality climbs everywhere, described below by type of climbing. Bouldering aside, much of the climbing uses traditional protection, with anchors for belays the only preset protection. There is bolted sport climbing in several areas, but often it is useful to add protection, both to reduce run-outs and add protection.**

**A good book covering many of the climbs in the area is by Stewart Green: "Best Climbs Moab" (a FalconGuides publication). There are several agencies in Moab at which rock climbing guides can be hired. We will as usual have at least one guide (hopefully Guido Bonvicini, and possibly another) for the week, and available to attendees. We typically arrange one and possibly two group climbing days for all climbers from complete novices to experts; the better climbers help the guides train and instruct the beginners, and help set up top ropes, before moving on to the more difficult climbs in the same area. These group climbing days are offered free of charge to attendees, their families, and friends. Other guiding services will require payments to the guides that are hired.**

**Guides and equipment rentals (these guides generally offer canyoneering as well) can be found at:**

- **http://cliffsandcanyons.com**
- **http://www.moabdesertadventures.com**
- **http://windgateadventures.com**

## TOWER CLIMBING

**The tower above is one of thousands of weirdly shaped spires and towers all around the Moab area. There are a few of these accessible to non-experts and climbing one is an experience of a lifetime. "Ancient Arts" is perhaps the best of these (some of you may have seen a Citibank commercial using this climb):**

**The weird corkscrew in the upper photo is at the top of a strange blade of rock shown on the right in the lower photo. As unlikely as it may seem this multi-pitch climb can be done by relative beginners, with the help of a guide (as I can testify to personally from a trip many years back, though I, like many beginners, decided to kneel rather than stand up at the top). There are some other relatively easy and accessible towers such as Castleton Tower (seen in many TV advertisements over the years), and there are many other towers that are more difficult and require more expertise.**

**There are many spectacular towers that are accessible from Moab but access takes long enough that expeditions should be planned for days prior or after the conference per se. For**

**example, a number of multipitch towers in Canyonlands are quite famous but the road access is lengthy, requires 4WD, and climbs should not be scheduled if one wants to return in time for the talks. A good example is Moses Tower in Taylor Canyon, as shown above. It is 600 feet tall and the climbs up it are five or six pitches, at about 5.11. Also in Canyonlands, adjacent to Island In the Sky, is Washer Woman Tower. It has six pitches mostly at 5.9 with one harder section that is closely bolted and can be aided. Washer Woman is famous for having an arch, and having a descent that makes a wild rappel from the arch as shown below.**

## SPORT

**The primary sport climbing area is Wall Street, a towering 500 foot tall cliff (yet another type of sandstone called Navaho), with many of the climbs ascending only the lower portion. The cliff is directly adjacent to UT 279 (also called Potash Road, and quite close to Moab). The approach to the climbs is approximately zero feet, because the road is sandwiched between the Colorado River and the cliff. There are hundreds of climbs along this wall. One picture of Wall Street is shown below (scanned from the book above--pardon the page crease). Other areas may be found in the guidebooks and local climbing shops.**

## CRACK CLIMBING

**There is a great deal of crack climbing everywhere, including along cliffs and on towers. Worth special mention is perhaps the world's most renowned crack climbing area, Indian Creek.**

## BOULDERING

**This sport is probably not as well developed in the Moab area, but is nonetheless possible. One of the excellent areas is Big Bend:**

**and elsewhere:**


## CANYONEERING

**This sport, known as canyoning in the rest of the world, has been offered and enjoyed at prior ASIC conferences in Europe. However, there are important differences in the American southwest. First, the temperature (in June) is quite warm, and wet suits (used in Europe) are not needed. Furthermore, some of the slot canyons that are explored are dry, and normal outdoor clothing and footwear is fine. Other canyons have water and waterfalls, and in those cases, bathing suits and footwear that can survive water are a good idea. The most exciting itineraries generally involve the participants being lowered on rappel into the canyon, before the walking/scrambling begins, or during the walk, as illustrated in the photo above. It should be noted that pure novices can go on these trips, as long as one uses one of the guides or guide services.**

## BIKING

### SLICK ROCK BIKING

**Moab is renowned worldwide for the many 'slick rock' bicycle trails (see above, and the photo at the top of this Activities page). This is a unique form of mountain biking that many will appreciate, even novices to the sport. The trails are generally well marked, and vary in difficulty and length. Appropriate bicycles can be rented at shops in town.**

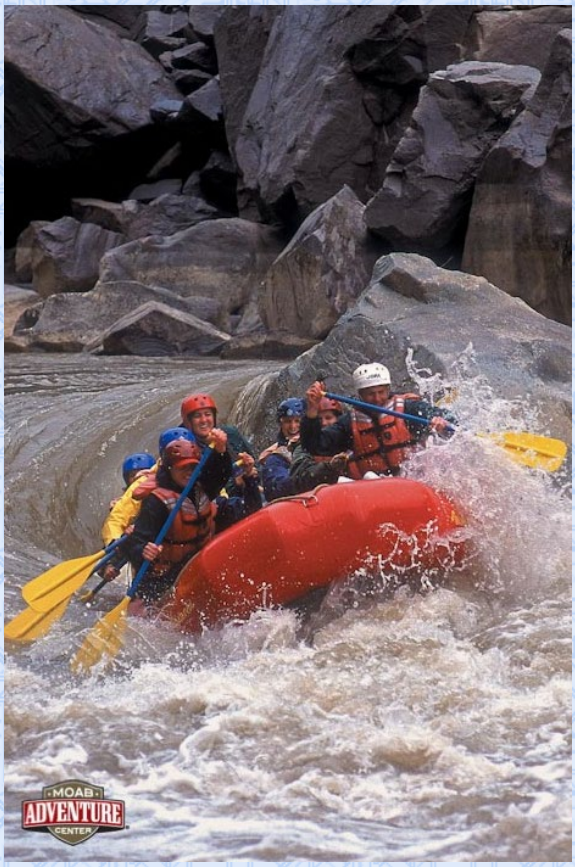
### ROAD BIKING

**Biking on paved roads is of course quite common, and as with hiking and slick**

**rock biking, it is hard to find anywhere to go that is not a scenic highlight. Of course, care must be taken to watch for road traffic, especially on the major roads.**

## WATER ACTIVITIES

### WHITE WATER RAFTING




### KAYAKING

**There are many companies in Moab that offer rafting and kayaking tours.**

## OTHER ACTIVITIES

**The above descriptions highlight only a few of the unique adventure activities to be found in the Moab area. Others include a variety of motorized tours, scenic flights, hot air ballooning, and more.**

## WEBSITES

**Some relevant websites:**

- **http://www.discovermoab.com/**
- **http://www.moabadventurecenter.com**
- **http://www.utah.com/moab/**
- **http://www.blm.gov/ut/st/en/fo/moab/recreation.html**
- **http://www.tripadvisor.com/Attractions-g60724-Activities-Moab_Utah.html**
- **http://www.moab-utah.com**
- **http://www.moabtourismcenter.blogspot.com**

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## Schedule

**There will be a single speaking session each day each with seven (or more) talks. These sessions will be held in a conference room at the Moab Valley Inn. Normal talk duration will be 30 minutes including questions and discussion. However, if there are more than 42 presenters, then some talks will be assigned shorter time limits. Information on submitting proposals for presentations is on the page of this website labeled "Talk Submissions".**

**The conference will start with registration and a reception at 15:30-16:15 on Monday, June 23. On subsequent days there will be drinks and light snacks from about 15:50 - 16:15, followed by a speaking session including a mid-session 15 minute drink break. Dinner will follow the session at about 20:15.**

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## Sessions

**The speakers each day are listed in alphabetical order, not necessarily in the order of speaking. The session chair each day (indicated in Bold/Italic/Underline) will choose the order of talks. Each day other than the first will start at 4:15 PM, and speakers should plan at most 30 minutes for talking and an additional 5 minutes for interruptions, questions, and discussion. Every talk should be aimed at a general audience.**

| **Day 1, June 23, 4:45PM** | |
|---|---|
| Bickhard, Mark | The Functional Dynamics of the Central Nervous System |
| Colunga, Eliana | Modeling the Emergence and Interactions of Early Word Learning |
| Dixon, Peter | Limitations in the control of individual and joint rhythmic action |
| MacKay, Don | Creativity, sentence comprehension and the brain: Lessons from amnesic H.M. |
| *Rouder, Jeff* | Discrete-states in working memory |

| **Day 2, June 24, 4:15pm** | |
|---|---|
| *Cox, Greg* | Modeling Information Accumulation in Recognition Memory: Speed-Accuracy Functions and RT Distributions |
| Dosher, | Object attention in moderate precision tasks: An elaborated |

| | |
|---|---|
| Barbara | template model account |
| Foster, James | Analogical Reinforcement Learning with Two-Stage Memory Retrieval |
| Shiffrin, Rich | A quantum account for a mysterious universal finding |
| Teodorescu, Kinneret | Learned Helplessness and Learned Prevalence: Exploring the causal relations of perceived controllability, reward prevalence and exploration |
| Westfall, Holly | Improvement in Long-term Memory Retention Created by Learning in an Exploratory State |

| **Day 3, June 25, 4:15pm** | |
|---|---|
| Cao, Rui | Categorization and Familiarity Processes in Memory Search |
| Hanson, Andrew | The Bugcatcher |
| Kowler, Eileen | Traveling in and out of blind alleys: Strategies of eye movement planning during maze solving and other tasks |
| Little, Dan | How do information processing systems deal with incongruent information? |
| *Sloutsky, Vladimir* | Language and Cognition: A Whofian baby meets non-whorfian reality |
| Steyvers, Mark | Aggregating Human Judgments in Ranking Problems |

| **Day 4, June 26, 4:15pm** | |
|---|---|
| Allen, Colin | Biographically plausible data sets and big data in the computational humanities |
| Jones, Matt | A theory of between-trial variability in diffusion models |
| *Lewandowsky, Steve* | Evidence for Removal of Information from Working Memory |
| Ramsey, Bill | Rethinking our Conception of Cognition |
| Shiffrin, Rich | Moving past BMS and MDL: Making model evaluation rational |
| Wantanabe, Takeo | Roles of attention and reward in perceptual learning |

| **Day 5, June 27, 4:15pm** | |
|---|---|
| Cheng, Patricia | Analytic versus Empirical Knowledge of the Concept of Causal Invariance |
| *Deyoe, Edgar* | Attentional Field Properties from Single Voxels |
| Lu, Zhong-Lin | Quick methods: Baynesian adaptive methods for estimating psychological functions |
| Ludwig, Kirk | Is Distributed Cognition Group Level Cognition? |

| | |
|---|---|
| Rand, Kristina Marie | Attention Requirements of Navigation with Severely Degraded Viewing |
| Teodorescu, Andrei | Absolutely Relative or Relatively Absolute - A study of relativity in decision making |

| **Day 6, June 28, 4:15pm** | |
|---|---|
| *Holden, John* | Attractor Dynamics Support Cognition |
| Ketels, Shaw | Testing two pedagogical prescriptions in the use of classroom response systems |
| Narens, Louis | Context and Probability Theory |
| Sasaki, Yuka | Enhanced Spontaneous Oscillations in the Supplementary Motor Area Are Associated with Sleep-Dependent Offline Learning of Finger-Tapping Motor-Sequence Task |
| Sperling, George | Visual Attention Filters for Color |
| Vanderkerckhove, Joachim | Latent variable methods for data fusion |

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## Authors, Titles, Abstracts

**Listing by speaker**

| | |
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| Speaker | Allen, Colin |
| Author 1 | Allen, Colin<br>Indiana University |
| **Title** | Biographically plausible data sets and big data in the computational humanities |
| **Abstract** | The ability to model words and their relationships by computational means is central to much of the digital humanities. But the methods developed thus far are inadequate if we wish to capture the ways in which experts bring different sorts of expertise in words to bear on the problems of finding meaning in text. For the digital humanities to advance it is necessary to go beyond fascination with larger and larger corpora, by also understanding and modeling the human-scale expertise of readers and authors, as shaped by their exposure to limited \"biographically plausible\" subsets of much larger digital collections. In this talk, I will describe systems that the InPhO group at Indiana University have built to allow relationships among words |

| | |
|---|---|
| | to be modeled at multiple scales. Our methods support various analyses, from high-level overviews to detailed digging into specific, historically important arguments. I will introduce the goal of using these methods to provide cognitive models of the reading decisions of domain experts. |

| | |
|---|---|
| Speaker | Bickhard, Mark |
| Author 1 | Bickhard, Mark<br>Lehigh University |
| **Title** | The Functional Dynamics of the Central Nervous System |
| **Abstract** | I will outline a model of the functional micro-dynamics of the brain, and say a few words about how this micro-level model can be integrated into a macro-level functional model. The general model addresses emergent phenomena such as cognition, emotions, and consciousness. The micro-level brain model makes sense of multiple phenomena that are known but are at best anomalous with respect to most standard models of brain function: It is simply false that neurons all function as integrate-and-fire threshold switches, and it is simply false that neurons are the only functional kind of cell in the brain. The model to be outlined naturally integrates such phenomena as: silent neurons that never fire; neurons with non-zero baseline rates of oscillation; volume transmitters and neuromodulators; the multifarious functionality of astrocytes; and so on. |

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| Speaker | Cao, Rui |
| Author 1 | Nosofsky, Robert<br>Indiana University |
| Author 2 | Cao, Rui<br>Indiana University |
| Author 3 | Cox, Gregory<br>Indiana University |
| Author 4 | Shiffrin, Richard<br>Indiana University |
| **Title** | Categorization and Familiarity Processes in Memory Search |
| **Abstract** | Two studies explored the impact of learning on short term memory search. Lists of 1 to 16 pictures were followed by a single picture target or foil. In a varied-mapping (VM) condition, targets and foils could switch roles across trials; in a consistent-mapping (CM) condition, targets and foils never switched roles; and in an all-new (AN) condition, on each trial a completely new set of items formed the memory set. In the first study, subjects were random assigned to |

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| | one of the conditions for one session. Larger memory sets reduced performance, but for targets this decrease in performance was due almost entirely to the lag with which the target was tested. In the CM condition, foil RTs were invariant with set size, whereas target RTs increased slightly with increasing lag. In the second study, four subjects completed over 30 sessions of CM and VM conditions followed by transfer conditions. In the main condition, 20% of the trials used as a target or foil the test probe from the prior trial. In the VM condition, repeating foils yielded dramatic interference, whereas no such interference was observed in the CM condition. This pattern of results provides evidence for the use of a categorization strategy in the CM condition. An exemplar-retrieval model based on familiarity had been proposed for earlier studies in this paradigm. However familiarity should rise for foils that were tested on the prior trial, so a model based solely on exemplar familiarity would predict reduced performance in CM. A new version of the model \'sums\' familiarity and category components and provides a unified account for all the above results. |

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| Speaker | Cheng, Patricia |
| Author 1 | McGillivray, Shannon<br>Weber State University |
| Author 2 | Cheng, Patricia<br>University of California, Los Angeles |
| **Title** | Analytic versus Empirical Knowledge of the Concept of Causal Invariance |
| **Abstract** | The present paper examines whether we humans learn the concept of causal invariance, the independence of causal powers, from our experiences or know it a priori. Causal invariance plays an essential role in the construction of a parsimonious representation of the causal world, but the environment provides no feedback on how the concept is defined. Causal learning without knowing the concept of causal invariance would be like Alice asking the Cheshire Cat for directions without knowing where she wants to go. There must therefore exist analytic knowledge of the concept in all cognitive systems capable of causal learning. The current paper reports an experiment using a blocking paradigm, taking advantage of the two distinct manifestations of causal invariance for continuous and binary outcome variables. In support of the analytic view, human participants showed more blocking of learning when the same outcome variable was perceived as continuous rather than binary, despite identical experiences with the target outcome except for experience conveying its continuous or binary nature. |

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| Speaker | Colunga, Eliana |

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| Author 1 | Colunga, Eliana<br>University of Colorado Boulder |
| Author 2 | Sims, Clare<br>University of Colorado Boulder |
| Author 3 | Schilling, Savannah |
| **Title** | Modeling the Emergence and Interactions of Early Word Learning |
| **Abstract** | Early word learning may be supported by a developmental feedback loop: the words a child learns early on support the generalization of attentional biases, which in turn guides subsequent word learning. In a series of neural network simulations and a longitudinal behavioral study with toddlers in the lab, we explore the interactions between words learned and word learning biases, and argue that it is this interaction that builds the individual developmental trajectories children follow. First, we look at the development of the shape bias for solids and how its emergence is accompanied by an attentional shift in novel noun generalizations for other solidities, in both networks and toddlers. Second, we look at how the emergence of a shape bias for solids is related to a shift in rate of learning for different kinds of words – shape-based or material-based – in networks and toddlers. Third, we look at how these interactions follow different developmental patterns in typically developing children at risk for language disorders, so-called "late talkers". Finally, we discuss the implications of this approach in increasing our understanding of language disorders, as well as our ability to improve early diagnosis and the design of individualized intervention plans. |

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| Speaker | Cox, Gregory |
| Author 1 | Cox, Gregory<br>Indiana University |
| Author 2 | Shiffrin, Richard<br>Indiana University |
| **Title** | Modeling Information Accumulation in Recognition Memory: Speed-Accuracy Functions and RT Distributions |
| **Abstract** | Cox and Shiffrin (2012) have argued for a dynamic approach to recognition memory which seeks to extend traditional models of memory to explain the time-course of retrieval. According to this approach, when an item is presented for a recognition decision, features of that item gradually accumulate in a memory probe held in short-term memory. This probe is compared in parallel to traces stored in episodic memory, generating a global familiarity signal |

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| | that changes over time as more and different information is accumulated in the probe. The characteristic time-course of this signal is shown to closely match the speed-accuracy trade-off functions found by Dosher (1984) and to jointly predict accuracy and RT distributions in large-scale recognition studies reported by Rae, Heathcote, Donkin, Averell, and Brown (in press) and Starns, Ratcliff, and McKoon (2012). Because the parameters of our model can be directly identified with memory processes, a dynamic approach can afford deep insights into recognition: For example, we find both quantitative and qualitative evidence that word frequency effects are best attributed to differences in the diagnosticity of the features used to encode words, rather than increased interference from prior episodes for high-frequency words; we also find evidence that speed instructions influence not just participants\' decision bounds, but also the fidelity with which the memory probe is constructed. These insights are not readily available from general RT models (e.g., diffusion or LBA) which can fit these data only by incorporating large amounts of variability in \"non-decision\" processes (e.g., feature sampling/encoding) that are explicitly modeled within our dynamic approach. |

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| Speaker | DeYoe, Edgar |
| Author 1 | DeYoe, Edgar<br>Medical College of Wisconsin |
| Author 2 | Puckett, Alexander<br>Medical College of Wisconsin |
| Author 3 | Ma, Yan<br>Marquette University |
| **Title** | Attentional Field Properties from Single Voxels |
| **Abstract** | This study employed a new technique to measure the spatial topography of visual attention that combines a unique “attentional drift” fMRI paradigm with a novel computational model based on single voxel responses in human visual cortex. In attention runs (a), subjects covertly attended and tracked a cued target at 4o or 8o eccentricity within a slowly rotating, dartboard-like array of stimulus segments. In sensory runs (b), the same segment was presented in isolation while subjects attended to a fixation target. Voxels having population receptive fields (pRFs) positioned along the trajectory of the target segment were phasically activated when (a) the focus of attention passed over their pRF or (b) when the isolated stimulus segment passed over the pRF. Thus, the duration of fMRI activation was proportional to (a) the width of the attentional focus or (b) the width of the stimulus segment. To compute the widths precisely, we fit the fMRI timecourse with a waveform generated by a model composed of a gaussian (or DOG) |

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| | attentional field, the stimulus/task sequence, the voxel\'s estimated pRF, and the hemodynamic response function. Our results demonstrate that the spatial topography of visual attention can be estimated from single voxels within V1, V2, V3, V4, VO, V3AB, IPS, LO and TO and show that the size of the attentional field scales with eccentricity and visual area. Moreover, voxels in multiple visual areas exhibit attention signals indicating a suppressive surround that is distinct from the response profile observed for the sensory pRF. |

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| Speaker | Dixon, Peter |
| Author 1 | Dixon, Peter<br>University of Alberta |
| Author 2 | Glover, Scott<br>Royal Holloway University of London |
| **Title** | Limitations in the control of individual and joint rhythmic action |
| **Abstract** | Rhythmic behaviour entails synchronizing repeated action with an internal or external signal. As such, there are three possible constraints on rhythmic action: perception of the signal, the action mechanism itself, and the control process that links the two. In the present research, we used a paradigm in which rhythmic finger movements are performed at a gradually increasing rate. The task can be performed either individually (e.g., left and right index fingers moving in synch) or jointly with a partner. We argue that constraints on these mechanisms can be discerned by examining the form of the function relating phase angle error to oscillation rate. The analysis reveals surprising similarities between individual and joint rhythmic action. |

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| Speaker | Dosher, Barbara |
| Author 1 | Dosher, Barbara<br>University of California Irvine |
| **Title** | Object attention in moderate precision tasks: An elaborated template model account |
| **Abstract** | Effects of attention have been widely tested in low precision tasks that discriminate quite different stimuli (i.e., horizontal and vertical pattern orientations), but less often in high precision tasks that discriminate similar stimuli (i.e., with very similar angles). Testing higher precision tasks provides insight into attention mechanisms and their effects across the psychometric function. An elaborated perceptual template model (ePTM; Jeon et al, 2009; Liu et al, 2009) identifies the mechanisms of dual-object attention—deficits in reporting one feature each for two objects compared to two features of one object. Dual object conditions report the orientation of one |

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| | Gabor object and phase of another; single object conditions report orientation and phase of the same object. Object attention effects were examined in a large data set comprising dual object and single object tests, each with a family of psychometric functions in six different levels of external noise for modestly high precision judgments. The data from the 168 stimulus and task conditions are accounted for by narrowing of the attended template compared to the unattended template—resulting in both asymptotic effects of attention in all conditions and substantial effects across the psychometric function in high external noise associated with external noise filtering. The ePTM, composed of two overlapping templates, nonlinearity, internal multiplicative and additive noise, and decision, provides a principled account of patterns of the effects of attention on the psychometric function sometimes associated with response and contrast gain. Collaborators: Zhong-Lin Lu, Songmei Han, & Shiau-Hua Liu. Supported by MH081018. |

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| Speaker | Foster, James |
| Author 1 | Foster, James<br>University of Colorado, Boulder |
| Author 2 | Jones, Matt<br>University of Colorado, Boulder |
| **Title** | Analogical Reinforcement Learning with Two-Stage Memory Retrieval |
| **Abstract** | We have recently proposed a model of analogical reinforcement learning, in which analogical comparison provides the RL algorithm with a measure of relational similarity, and RL provides feedback signals that can drive analogical learning. Especially useful analogies produce new schemas that are added to the memory pool. Model performance is considered with respect to a baseline model in which schema induction is not guided by RL feedback signals. This approach relies on combining structure mapping with exemplar-based learning, which is computationally expensive. The current work addresses this challenge by integrating principles from the two-stage MAC/FAC model of analogical retrieval, in which the first stage uses fast feature-vector similarity to efficiently retrieve a set of candidate exemplars, and the second stage uses structural alignment to determine the best analogical matches. This new implementation enables a more psychologically plausible form of analogical inference from the most useful stored exemplars and schemas to novel situations. |

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| Speaker | Hanson, Andrew |
| Author 1 | Hanson, Andrew<br>Indiana University |

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| Author 2 | Tullis, Jonathan<br>Indiana University |
| Author 3 | Goldstone, Rob<br>Indiana University |
| **Title** | The Bugcatcher |
| **Abstract** | We investigate the features of a simple interactive computer game we call The Bugcatcher. The game contains a hidden (simulated) mechanical linkage between the motion of the mouse and the motion of a \"flyswatter\" on the screen. The issue is to compare the performance in swatting a randomly-placed \"bug\" on the screen with and without visual knowledge of the mechanical linkage. Some theories of prompting and retention of prompting information would predict that subjects who have seen the linkage performing will have better performance and much better retention of performance quality than those who do not. We investigate a variety of ways of testing this hypothesis, with results that are not always intuitive. |

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| Speaker | Holden, John |
| Author 1 | Holden, John<br>University of Cincinnati |
| Author 2 | Pavlov-Garcia, Olivia<br>University of Cincinnati |
| **Title** | Attractor Dynamics Support Cognition |
| **Abstract** | Historically, cognitive science relied on representation as a formative assumption. Representations are semantically imbued entities that serve as a basis for symbolic and/or computational operations in support of cognitive activity. Given their foundational status, it is no surprise that representation and symbolic computation saw critiques over the years. Recently, a cadre of cognitive scientists, partly influenced by the mathematics of dynamical systems, proposed theories relying on an alternate formative assumption: Human cognition and action entail self-organization; dynamic, fluctuating embodied states that persist across a range of time scales. The essential thrust of this view is the hypothesis that certain patterns of persistent, organized biological states could obviate the role representations have traditionally played in supporting cognitive theory. Advocates of this approach often implicate attractors, and attractor dynamics as a straightforward conceptual alternative to representation. The goal of this presentation is to plausibly illustrate how dynamical concepts can do much of the theoretical work that was traditionally ceded to static representations in narratives of |

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| | classically cognitive activities. Sinusoidal manipulations are introduced to temporal estimation performance, simple response time performance, and speeded word naming performance. The entrainment expressed across these three elementary cognitive activities is examined and characterized with measures of attractor strength. The study outcomes suggest that cognitive performance routinely entails coordination across a range of temporal scales. Cognitive performances are also "sticky", they spontaneously entrain to environmental and functional regularities. Moreover, the nature of the coupling activity expressed in any given cognitive activity is emergent, in that its expression complies with the idiosyncratic details of task demands. |

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| Speaker | jones, matt |
| Author 1 | Jones, Matt<br>university of colorado |
| **Title** | A theory of between-trial variability in diffusion models |
| **Abstract** | Diffusion models of speeded choice provide excellent accounts of accuracy, the distribution of correct response times (RTs), and their dependence on various experimental factors. However, they cannot account for error RTs without additional assumptions that the drift rate and starting point of the evidence process vary across trials. If this across-trial variability is governed by arbitrary probability distributions, the model becomes unfalsifiable (Jones & Dzhafarov, 2014). Here I offer a theory of across-trial variability based on sequential effects from incremental learning. This theory makes precise predictions about how model parameters vary from trial to trial, thus eliminating the problem of excess flexibility. I explore three types of sequential effects (from learning the response base rate, drift rate, and drift criterion), grounded in the classical interpretation of the diffusion model as a sequential likelihood ratio test. The resulting model can reproduce the benchmark crossover effect (fast errors under speed instructions, slow errors under accuracy instructions) that is held as the primary evidence for across-trial variability. |

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| Speaker | Ketels, Shaw L. |
| Author 1 | Ketels, Shaw L.<br>University of Colorado Boulder |
| Author 2 | Healy, Alice F.<br>University of Colorado Boulder |
| Author 3 | Jones, Matt<br>University of Colorado Boulder |

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| Author 4 | Lalchandani, Lakshmi<br>University of Colorado Boulder |
| Author 5 | Martichuski, Diane K.<br>University of Colorado Boulder |
| **Title** | Testing Two Pedagogical Prescriptions in the Use of Classroom Response Systems |
| **Abstract** | We manipulated the usage of classroom response systems, or "clickers," in four statistics classes taught by the same instructor at the University of Colorado Boulder. In the first experiment, we manipulated the schedule of clicker questions in two classes, taught during the Spring 2013 semester. Clicker questions from a given lecture were either all presented at the end of the lecture (delayed), or interspersed throughout the lecture (interleaved). In the second experiment, we manipulated the format of the clicker questions themselves, comparing the standard multiple choice question format (recognition) to a question format demanding recall of information before selecting among response options (recall). In both experiments, conditions were alternated within-subjects for both classes individually, and these patterns of alternation were counterbalanced between the two classes. Performance on midterm and final exam questions was used as the dependent measure for both experiments. In the first experiment, superior test performance was expected for material presented in the interleaved condition. In the second experiment, superior test performance was expected for material presented in the recall condition. |

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| Speaker | Kowler, Eileen |
| Author 1 | Kowler, Eileen<br>Rutgers University |
| Author 2 | Zhao, Min<br>Rutgers University |
| Author 3 | Hemmer, Pernille<br>Rutgers University |
| **Title** | Traveling in and out of blind alleys: Strategies of eye movement planning during maze solving and other tasks |
| **Abstract** | Visuo-motor tasks require eye movements to ensure the line of sight reaches critical details at critical points in time. We recorded eye movements of observers during a challenging visuo-motor task, namely, moving a computer mouse through an overhead maze displayed on a screen. Mazes were randomly generated and difficulty varied considerably. Analyses of eye movements showed that strategies fell into two distinct phases: (1) Guidance, in which |

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| | the eye made saccades to critical points along the path and the mouse caught up; (2) Exploration, in which the mouse remained relatively stationary while the eye searched for the correct path. Although guidance seems to be more costly because it leads to frequent episodes of traveling down blind alleys, the maze-travelers we tested (with some interesting individual exceptions) were reluctant to devote too much time to exploration, even though exploration had demonstrable benefits for learning the maze. We conclude that the choice of strategies governing how to coordinate movements of hand and eye takes into account multiple factors, including perceived or actual costs of using internal resources to remember or plan the path. |

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| Speaker | Lewandowsky, Stephan |
| Author 1 | Lewandowsky, Stephan<br>University of Bristol |
| Author 2 | Ecker, Ullrich<br>University of Western Australia |
| Author 3 | Oberauer, Klaus<br>University of Zurich |
| **Title** | Evidence for Removal of Information from Working Memory |
| **Abstract** | Many complex cognitive activities, such as mental arithmetic, rely on an agile and flexible working memory (WM) that can be cleared of no-longer relevant information upon demand. For example, intermediate steps during mental arithmetic need to be forgotten quickly lest they interfere with the final result. We use a modified version of an established updating paradigm to provide evidence for an active removal process that purges no-longer-needed information from WM. We present experiments that furthermore show that this removal process is an item-specific operation and that updating subsets of information held in working memory involves switching between maintenance and updating modes of processing. We reject other candidate explanations for the data, such as passive decay or displacement by selective rehearsal. We conclude that a full explanation of WM control processes must include a provision for removal of information. |

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| Speaker | Little, Daniel |
| Author 1 | Little, Daniel<br>The University of Melbourne |
| Author 2 | Eidels, Ami<br>The University of Newcastle |

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| Author 3 | Fific, Mario<br>Grand Valley State University |
| Author 4 | Wang, Tony<br>The University of Melbourne |
| **Title** | How do information processing systems deal with incongruent information? |
| **Abstract** | In this presentation, we analyze how different information processing architectures deal with incongruent information. For instance, a robust finding is that RTs are slower when dealing with incongruent sources of information (e.g., determining whether a whale is a fish or a mammal? A whale has biological properties which make it a mammal but lives in an environment typically populated by fish) than when dealing with congruent sources of information (e.g., determining whether a trout is a mammal or a fish). We argue that the effect of incongruent information depends on the processing architectures and derive new measure of information processing called resiliency by drawing an analogy to the capacity of an information processing system. By varying the salience of the incongruent information source, we show that serial, parallel and coactive information processing architectures predict qualitatively different resilience functions. We analyze four previously published experiments and show that this measure provides convergent evidence about the underlying processing architecture. |

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| Speaker | Lu, Zhong-Lin |
| Author 1 | Lu, Zhong-Lin<br>Department of Psychology, The Ohio State University |
| **Title** | Quick methods: Baynesian adaptive methods for estimating psychological functions |
| **Abstract** | Adaptive procedures are developed to reduce the burden of data collection in psychophysics by creating more efficient experimental test designs and methods of estimating either statistics or parameters. In some cases, these adaptive procedures may reduce the amount of testing by as much as 80% to 90%. For example, adaptive methods for estimating properties of psychometric functions improve test efficiency by targeting stimuli to pre-specified regions of the empirical psychometric functions (e.g. threshold region) based on subject responses. Our goal is to develop adaptive methods for the estimation of psychophysically measured functions and surfaces. In this talk, I will de scribe the Bayesian adaptive framework for optimizing psychophysical tests and its application to the development of various quick methods for measuring TvC |

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| | functions, d\' psychometric functions, contrast sensitivity functions, and forgetting functions. I will provide animations, simulations and psychophysical validations of these methods, and discuss challenges and future directions. |

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| Speaker | Ludwig, Kirk |
| Author 1 | Ludwig, Kirk<br>Indiana University |
| **Title** | Is Distributed Cognition Group Level Cognition? |
| **Abstract** | Groups can sometimes solve problems more quickly and efficiently than individuals, and can sometimes solve problems which it is unlikely that any of their members acting alone could solve. Moreover, in some circumstances, it appears that groups exhibit cognitive capacities or mechanisms for problem solving which are different in kind from those exhibited by any of their members. In this paper, I will be concerned with recent arguments (Theiner, Goldstone and Allen, 2010 and related papers), inspired in part by considerations that are at play in the extended mind hypothesis, that seek to move from observations of the sort just mentioned to the existence of genuinely group level cognitive processes and capacities —in the sense that they are an emergent phenomenon which is properly attributed at the group level and that they support the attribution of a group mind, at least so far as cognition goes. I argue that once we have disentangled both the various senses we can give to the notions of a cognitive system, a cognitive process, a cognitive state or property, and a cognitive capacity, and have distinguished among the various kinds of cases that have been offered as concrete instances of group level problem solving, memory, and so on, we can see that there is no sound argument to the conclusion that there are genuine group level minds or cognitive processes except insofar as we interpret that in a Pickwickian sense. |

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| Speaker | MacKay, Don |
| Author 1 | MacKay, Don<br>UCLA Psychology Dept. |
| **Title** | Creativity, sentence comprehension and the brain: Lessons from amnesic H.M. |
| **Abstract** | This talk presents evidence for strong and previously unsuspected links between the hippocampal region (HR) and the ability to accurately comprehend novel phrases and propositions. The evidence comes from 11 studies with H.M., an amnesic with HR damage but virtually no neocortical damage. Tested was the comprehension of metaphors, ambiguous words, ambiguous sentences, and thematic roles (who-did-what-to-whom in sentences), |

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| | and comprehension when reading sentences aloud and making judgments of grammaticality. The results identified two types of comprehension process: fast comprehension processes without HR involvement for understanding the meanings of familiar words and phrases, and creative comprehension processes with HR involvement for computing the thematic relations between words and phrases and for integrating familiar word meanings with their sentence context to form useful internal representations of novel phrases and propositions. I discuss the similarities between the creative processes for comprehending sentences and creativity in other domains, e.g., problem solving. |

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| Speaker | Narens, Louis |
| Author 1 | Narens, Louis<br>UCI |
| **Title** | Context and Probability Theory |
| **Abstract** | A theory is presented about how context and probability are related in experimental psychology. The matter is not easily treated by traditional probability theory, because contexts have non-traditional logical structure. For example, the intersection of contexts may not be a context, and similarly, the disjunction of contexts may not be a context. (Amos Tversky and colleagues and Jerome Busemeyer and colleagues have exploited the latter in a phenomenon known as the ``disjunction effect''.) This makes the natural probability theory for contextual studies non-boolean. The talk explains such a "natural probability theory" and its logic. |

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| Speaker | Ramsey, William |
| Author 1 | Ramsey, William<br>Philosophy Dept., University of Nevada Las Vegas |
| **Title** | Rethinking our Conception of Cognition |
| **Abstract** | In various contexts and for various reasons, writers often define cognitive processes and architectures as those involving representational states and structures. Similarly, cognitive theories are also often delineated as those that invoke representations to explain various cognitive processes. In this talk, I will present some reasons for rejecting this way of distinguishing the cognitive from the non-cognitive. Some of the reasons against defining cognition in representational terms are that doing so needlessly restricts our theorizing, it undermines the empirical status of the representational theory of mind, and it encourages wildly deflationary and explanatorily vacuous conceptions of representation. If there is time, I'll consider alternative ways we might try to capture what is distinctive about cognition and cognitive theorizing, though I will |

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| | also suggest the demarcation problem is far less important than many have thought. |

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| Speaker | Rand, Kristina |
| Author 1 | Rand, Kristina<br>University of Utah |
| **Title** | Attention Requirements of Navigation with Severely Degraded Viewing |
| **Abstract** | The ability to navigate through an environment without getting lost is a challenge for many, but may be even more difficult with vision loss. Low vision research has focused primarily on the low-level detectability of mobility hazards. Although important, visual factors are likely not the sole contributor to difficulty navigating. This work evaluated a cognitive factor – the increased demands of keeping oneself safe while walking with degraded vision (mobility monitoring) – affects navigation and spatial learning. In Experiment 1, participants walked short paths while performing an auditory listening task, half with simulated degraded vision and half with normal vision. Auditory task performance was poorer when navigating with simulated degraded vision, suggesting increased cognitive demands with degraded vision. Experiment 2 tested whether the cost could be attributed to the additional attentional resources needed to walk when mobility-monitoring demands are higher. Participants walked one set of paths while guided (low mobility-monitoring demands) or independently (high mobility-monitoring demands). Importantly, access to visual information was equated for guided and unguided trials; participants wore blur goggles for both conditions. Error rates were higher in the unguided condition, suggesting more attention is required to navigate with high demands of risk monitoring. Experiment 3 used a meditational analysis to test whether attention task errors predicted spatial learning. Participants performed an auditory task while learning the location of landmarks, navigating 2 paths guided and 2 paths unguided. Difference scores on the attention task while navigating guided compared to unguided predicted spatial learning outcomes, providing support for the idea that attentional resources mediates the relationship between mobility-monitoring demands and spatial learning. |

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| Speaker | Rouder, Jeffrey |
| Author 1 | Rouder, Jeffrey<br>University of Missouri |
| **Title** | Discrete-states in working memory |
| **Abstract** | I explore whether visual working memory is mediated by a discrete- |

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| | slot model, in which items are either in memory or not, or by a resource model, in which the memory for an item reflects the share of latent resources devoted to it. One finding concordant with the discrete-slot model is that in a production paradigm, responses are seemingly a mixture of stimulus-driven responses and guesses (Zhang & Luck, 2008, Psy. Sci). Alternative accounts from the resource theorists is that guessing-like behavior comes from responses to distractor items (Bays et al., 2009, J. Vis) or to items that did not receive many resources (van den Berg et al., 2014, Psy Rev). We use a production paradigm with items that vary in an angular displacement dimension. If guessing occurs, it has a different distribution than either responding to distractors or to responding to targets with a low proportion of resources. We show that the guessing signature remains and cannot be due to these resource-based alternatives. We also show a novel finding: On some trials participants remember the angular disparity finely on a continuous scale, and on others they remember it categorically as left or right. |

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| Speaker | Sasaki, Yuka |
| Author 1 | Sasaki, Yuka<br>Brown University |
| **Title** | Enhanced Spontaneous Oscillations in the Supplementary Motor Area Are Associated with Sleep-Dependent Offline Learning of Finger-Tapping Motor-Sequence Task |
| **Abstract** | Sleep is beneficial for various types of learning and memory, including a finger-tapping motor-sequence task. However, methodological issues hinder clarification of the crucial cortical regions for sleep-dependent consolidation in motor-sequence learning. Here, to investigate the core cortical region for sleep-dependent consolidation of finger-tapping motor-sequence learning, while human subjects were asleep, we measured spontaneous cortical oscillations by magnetoencephalography together with polysomnography, and sourcelocalized the origins of oscillations using individual anatomical brain information from MRI. First, we confirmed that performance of the task at a retest session after sleep significantly increased compared with performance at the training session before sleep. Second, spontaneous and fast- oscillations significantly increased in the supplementary motor area (SMA) during post-training compared with pretraining sleep, showing significant and high correlation with the performance increase. Third, the increased spontaneous oscillations in the SMA correlated with performance improvement were specific to slow-wave sleep. We also found that correlations of oscillation between the SMA and the prefrontal and between the SMA and the parietal regions tended to decrease after training. These results suggest that a core brain region for sleep-dependent consolidation of the finger-tapping motor-sequence learning resides in the SMA contralateral to the |

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| | trained hand and is mediated by spontaneous and fast-oscillations, especially during slow-wave sleep. The consolidation may arise along with possible reorganization of a larger-scale cortical network that involves the SMA and cortical regions outside the motor regions, including prefrontal and parietal regions. |

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| Speaker | Shiffrin, Richard |
| Author 1 | Shiffrin, Richard<br>Indiana University |
| Author 2 | Busemeyer, Jerome<br>Indiana University |
| Author 3 | Wang, Joyce<br>Ohio State |
| Author 4 | Solloway, Tyler<br>Ohio State |
| **Title** | A quantum account for a mysterious universal finding |
| **Abstract** | When two questions are asked back to back in a national survey the answers often change depending on the order of the questions (half the respondents are asked the questions in each order). This is a form of \'context effect\' and could be part of almost any cognitive model. When looking at all surveys over the last ten years that asked two questions back to back, a peculiar regularity seems to hold for all 70 surveys: The change in the probability of saying yes to both questions plus the change in the probability of saying no to both questions adds to zero. This QQ-equality is not required mathematically; in fact there are surveys that should not and do not show this result (when, for example, extra information is inserted between the two questions). It is hard to come up with any cognitive interpretation or constraints that would require the QQ-equality. We present a quantum model of human decision making that predicts QQ-equality to hold universally, regardless of parameterization. This prediction was derived a priori and verified by results obtained by others years earlier. The fact that the results support the prediction should not only lead cognitive scientists to search for alternative models to explain the finding, but also lead them to give the quantum probability theory serious consideration. |

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| Speaker | Shiffrin, Richard |
| Author 1 | Shiffrin, Richard<br>Indiana University |
| **Title** | Moving past BMS and MDL: Making model evaluation rational |
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| **Abstract** | I present a generalization of Bayesian Model Selection in which models are treated as greatly simplified but useful accounts. The goal is to use the observed data to induce the probabilities that each model provides the best approximation to the true model and the data produced by that true model. Induction and inference are conditional upon some criterion of 'best approximation' that must be chosen in accord with one\'s goals and task. The approach accords with actual scientific practice, allows one to place the emphasis on data rather than models, allows one to incorporate prior knowledge about both data and models (because there is a direct correspondence between the two), and allows one to incorporate qualitative criteria into quantitative model selection. The key insight is based on the idea that the true model produces a distribution of outcomes for a given experiment, that the observed data are a sample from that true distribution, and that Bayesian induction provides posterior probabilities that each model produces a distribution that best approximates that true distribution, conditional on an observed sample from that true distribution, a goodness of fit criterion, and prior knowledge that allows one to assign prior probabilities to both data distributions and models. |

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| Speaker | Sloutsky, Vladimir |
| Author 1 | Sloutsky, Vladimir<br>Ohio State University |
| **Title** | Language and Cognition: A Whofian baby meets non-whorfian reality |
| **Abstract** | What is the role of language in categorization and category learning? The "Whorfian Infant" hypothesis argues that language (specifically, count nouns) supervises category learning by attracting attention to commonalities among category members. Proponents of the hypothesis assume that the mechanisms underlying effects of labels start operating in early infancy. At the same time, there is evidence that the ability to integrate auditory-visual information exhibits protracted developmental time course, with infants and young children often experiencing difficulty or even failure when such integration is required. In particular, early in development, auditory input (including words) attenuates processing of corresponding visual input. This finding seems to undermine the "Whorfian infant" hypothesis and in attempt to offer an alternative I will focus on three issues. First, I review some data pertaining to cross-modal interference. Second, I consider the role of attention in category learning and how labels may affect attention. Third, I present evidence that early category learning is accompanied by distributed rather than selective attention, which undermines the very mechanism by which labels may affect category learning. Finally, I present data suggesting that labels may supervise learning in adults and discuss how this outcome may emerge in the course of |

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| | development. |

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| Speaker | Sperling, George |
| Author 1 | Sun, Peng<br>University of California, Irvine |
| Author 2 | Chubb, Charles<br>University of California, Irvine |
| Author 3 | Wright, Charles E. (Ted)<br>University of California, Irvine |
| Author 4 | Sperling, George<br>University of California, Irvine |
| **Title** | Visual Attention Filters for Color |
| **Abstract** | An attention filter is a top-down instruction-initiated brain process of feature-based attention that allows selected visual information to pass but attenuates unselected information. In the centroid-judgment paradigm, subjects use a mouse to position a pointer at the centroid--the center of gravity--of a briefly displayed cloud of dots and receive precise feedback. Centroid judgments are efficient statistical summary representations (SSRs). Our centroid judgment paradigm enables the quick measurement of human perceptual attention filters as accurately as photographic color filters. Here's how: A subset of dots is distinguished by some characteristic, such as a different color, and subjects judge the centroid of only the distinguished subset, e.g., dots of a particular color ignoring the other colors. A simple linear analysis determines the precise weight to the judged centroid of every dot of every color in the display, i.e., the attention filter for that particular attended color in that context. Here we describe attention filters for colors positioned at various points along orthogonal red-green, blue-yellow, and black-white axes. The selectivities (\\\"quality\\\") of attention filters along these three axes are remarkably similar and well predicted by the JNDs between the target color and the nearest distracters. However, attention filters that discriminate among different equi-luminant hues along a color circle are much more selective than predicted from the data described above, and this makes ecological sense. We illustrate here a large set of precise, quantitative data that characterizes processes of feature-attention that previously were mostly described only qualitatively. |

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| Speaker | Steyvers, Mark |
| Author 1 | Steyvers, Mark<br>UC Irvine |

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| Author 2 | Lee, Michael<br>UC Irvine |
| Author 3 | Liu, Emily<br>UC Irvine |
| **Title** | Aggregating Human Judgments in Ranking Problems |
| **Abstract** | We develop a cognitive modeling approach, motivated by classic theories of knowledge representation, memory, and judgment, for combining people's rankings of items. The model makes simple assumptions about how individual differences in knowledge as well as recall processes lead to observed ranking data in behavioral tasks. We implement the cognitive model as a Bayesian graphical model, and use computational sampling to infer an aggregate ranking and measures of the individual expertise. We demonstrate that the model performs well in producing an aggregate ranking that is often close to the ground truth and, as in the ''wisdom of the crowd'' effect, usually performs better than most of individuals. In addition, we show that it is important to take into account memory processes in top-ten ranking tasks where subjects not only have to rank the items but also have to recall the items that need to be ranked. |

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| Speaker | Teodorescu, Kinneret |
| Author 1 | Teodorescu, Kinneret<br>Indiana University<br>kiteodor@indiana,edu |
| Author 2 | Erev, Ido<br>The Technion - Israel Institute of Technology |
| **Title** | Learned Helplessness and Learned Prevalence: Exploring the causal relations of perceived controllability, reward prevalence and exploration |
| **Abstract** | Exposure to uncontrollable outcomes was found to trigger learned helplessness: a state in which the agent fails to take advantage of regained control due to lack of exploration. While the implications of this phenomenon have been widely studied, its underlying cause remains undetermined. One can learn not to explore because the environment is uncontrollable, because the average reinforcement is low or because rewards are rare. The current paper presents a simple experimental paradigm that contrasts the predictions of these three contributors and offers a unified psychological mechanism that underlies the empirical phenomena. The results demonstrate that learned helplessness is not correlated with either perceived controllability or the average reward, suggesting that reward prevalence is a better predictor of exploration behavior. A simple computational model where exploration decisions are based on small samples of past experiences captures the empirical phenomena while also providing a cognitive basis for feelings of |

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| | uncontrollability. |

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| Speaker | Teodorescu, Andrei |
| Author 1 | Teodorescu, Andrei<br>Indiana University |
| Author 2 | Moran, Rani<br>Tel-Aviv University |
| Author 3 | Usher, Marius<br>Tel-Aviv University |
| **Title** | Absolutely Relative or Relatively Absolute - A study of relativity in decision making |
| **Abstract** | In sequential sampling decision models, the evidence accumulation process is terminated by a stopping rule which represents the agent's response caution. The stopping rule can be applied to the absolute level of activations representing the accumulated evidence for each of the response alternatives. Independent Race and LCA models operate under this assumption. On the other hand, the stopping criterion can also be applied to some function of the relation between the absolute activations. For example, in diffusion models the criterion is applied to the difference while in normalization models it is applied to the ratio. By definition, models implementing relative thresholds are invariant to input manipulations that do not affect the relative aspect of the evidence to which the stopping rule is applied (i.e. difference or ratio). Therefore, a manipulation that only affects the absolute input level without altering its relative aspects could discriminate between relative threshold models, which would predict the null effect, and absolute threshold models, which are sensitive to the overall increase in activation. We present an experimental paradigm which allows for the manipulation of absolute inputs while maintaining constant either their ratio (Multiplicative Boost condition - MB) or their difference (Additive Boost condition – AB). The results reveal a surprising sensitivity to the absolute input. While absolute threshold models naturally account for these combined results, relative threshold models require additional assumptions such as a dependency between processing noise and stimulus intensity. Implications for model architectures, model assumptions and different conclusions about the underlying cognitive mechanisms are discussed. |

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| Speaker | Vandekerckhove, Joachim |
| Author 1 | Vandekerckhove, Joachim<br>UC Irvine<br>joachim+_+@uci.edu |
| Author 2 | Nunez, Michael |

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| Author 3 | Baribault, Beth |
| Author 4 | Srinivasan, Ramesh |
| **Title** | Latent variable methods for data fusion |
| **Abstract** | We present a latent variable modeling approach to the joint analysis of behavioral and neural data. The approach relies on defining a fully unobserved structure that determines the covariance between cognitive model parameters and neurophysiological measures. Such measures may be task-dependent ones (to focus on experimental effects) or they may be task-independent (resting state variables to focus on individual differences). The models also allow for the inclusion of external covariates to explain individual differences in addition to experimental design variables. We will present an example data set involving EEG measures in a steady state evoked potential task. We will also discuss issues of robustness under misspecification. |

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| Speaker | Watanabe, Takeo |
| Author 1 | Watanabe, Takeo<br>Brown University |
| **Title** | Roles of attention and reward in perceptual learning |
| **Abstract** | Perceptual learning (PL) is defined as long-term performance improvement on a perceptual task as a result of perceptual experience. We first found that PL occurs for task-irrelevant and subthreshold features and that pairing task-irrelevant features with rewards is the key to form task-irrelevant PL (TIPL) (Watanabe, Nanez & Sasaki, Nature, 2001; Watanabe et al, 2002, Nature Neuroscience; Seitz & Watanabe, Nature, 2003; Seitz, Kim & Watanabe, 2009, Neuron; Shibata et al, 2012, Science). These results suggest that PL occurs as a result of interactions between reinforcement and bottom-up stimulus signals (Seitz & Watanabe, 2005, TICS). On the other hand, fMRI study results indicate that lateral prefrontal cortex fails to detect and thus to suppress subthreshold task-irrelevant signals. This leads to the paradoxical effect that a signal that is below, but close to, one's discrimination threshold ends up being stronger than suprathreshold signals (Tsushima, Ssasaki & Watanabe, 2006, Science). We confirmed this mechanism by showing that task-irrelevant learning occurs only when a presented feature is under and close to the threshold (Tsushima et al,2009, Current Biol). From all of these results, we conclude that attention and reward play important but different roles in PL. |

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| Speaker | Westfall, Holly |

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| Author 1 | Westfall, Holly<br>University of South Florida |
| Author 2 | Malmberg, Kenneth<br>University of South Florida |
| **Title** | Improvement in Long-term Memory Retention Created by Learning in an Exploratory State |
| **Abstract** | We examined how engaging participants in a visual search task while studying a list of to-be-remembered words affected performance in a subsequent memory task. In a recent publication, we reported that the performance of the search task improved free recall, but the results did not extend to yes–no or forced choice recognition memory testing. These results suggested that the visual search task enhanced the encoding of episodic context information, but not the to-be-remembered item information. In a new set of experiments, we extend our findings to two memory tasks that require the participant to form inter-item associations: a cued recall task, in which participants are asked to learn English-Swahili word pairs, and a serial recall task, in which participants are asked to learn a list of words in the same order they were studied. In both experiments, participants first learned stimuli to a criterion of 100% accuracy, and then when tested after a 48-hour delay, were more likely to remember stimuli for which they had to visually search during study than stimuli learned under standard study instructions. The slower rate of forgetting suggests that visual search facilitated storage of episodic context information. |

# ASIC 2014

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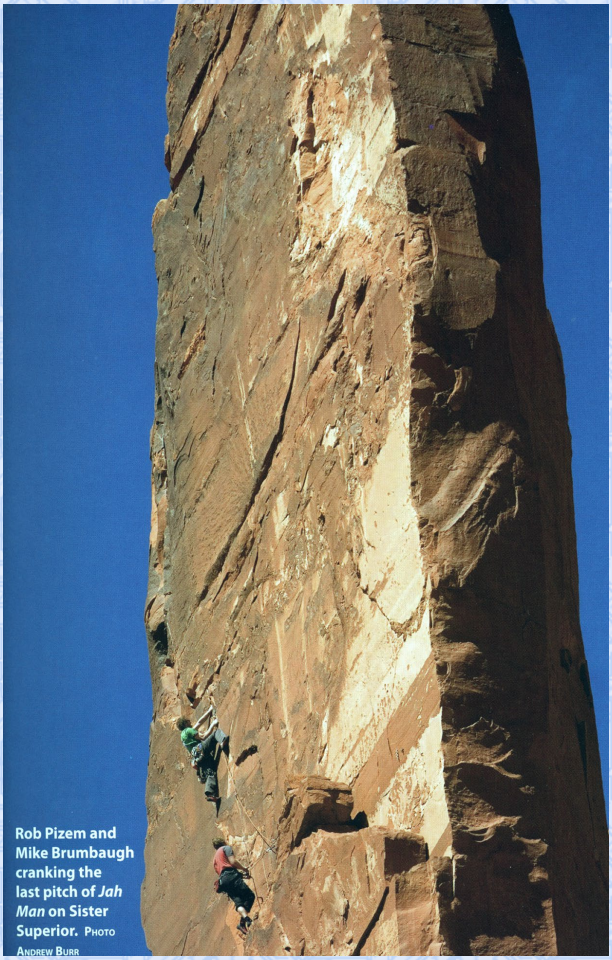

Rob Pizem and Mike Brumbaugh cranking the last pitch of *Jah Man* on Sister Superior. Photo Andrew Burr

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