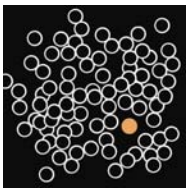
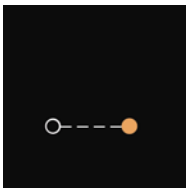
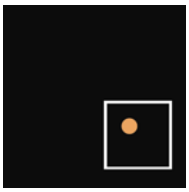
**neuroscience and correctional facility design workshop:**
understanding cognitive processes in correctional settings

# workshop report

**New Orleans, October 7-8, 2006**







**Jay Farbstein & Associates, Inc.**

April 18, 2007

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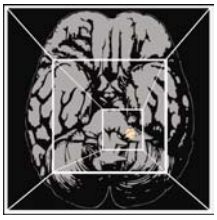

# Contents

## Disclaimer

This project was supported in part by a Cooperative Agreement from the National Institute of Corrections, Washington, DC. The opinions stated in this report are those of the authors only and not of the National Institute of Corrections.

# Introduction

## Project Origins

This project grew from a complex set of circumstances which included the following (and which are detailed below):

- An interest on the part of the American Institute of Architects (AIA), initiated by a challenge from Jonas Salk, in neuroscience and its usefulness in understanding responses to architecture.
- This led to the formation of ANFA - the Academy of Neuroscience for Architecture - which has explored applications in schools, places of worship, laboratories, healthcare settings, and facilities for the aging. ANFA's attention was just being directed to correctional settings.
- The AIA's Academy of Architecture for Justice (AAJ) - which was in the process of establishing a research agenda. Its annual conference in 2005 was held in San Diego, home to ANFA making possible discussions of mutual interests.
- The AAJ research agenda highlighted an initiative around the application of neuroscience to correctional environments, suggesting that the project begin with a direction-setting workshop attended by correctional architects, neuroscientists, and correction administrators.
- The National Institute of Corrections (NIC) reviewed drafts of the research agenda and sent it out to its Large Jail Network for comments. NIC was sufficiently interested in the concept to provide the bulk of funding needed to support the workshop and subsequent field research.
- The AIA also provided partial funding and logistical support. Further funding was provided by Turner Construction Company.

## Overview of The Project

Correctional facilities are "total environments" where inmates may spend long periods and are completely dependent on the institution for all of their needs. As total environments, these facilities have substantial impacts on the people they house.

More specifically, prior research (references are available on request) has demonstrated that correctional environments can have positive or negative impacts on inmate behavior, contributing to or inhibiting the achievement of facility operator's objectives for inmate management – such as safety, security, order, freedom from assaults and destruction of property – and even progress toward habilitation.

Recently, NIC has emphasized inmate behavior management and its operational and design correlates. Such factors as crowding, space allocations, availability of resources, levels of noise, and the like can all be important when viewed in light of inmate behavior management approaches.

Without intending to criticize prior research, it can be characterized as having certain limitations – both in terms of its findings as well as the dissemination and application of those findings. It can be argued that local jurisdictions which are planning jails would benefit greatly from research-based findings that were clear, convincing and applicable to decisions that are made during this phase – decisions which will have to be lived with for generations. In general, research done to date has not generally filled this need.

At the same time that agencies such as NIC and NIJ have been concerned with and supportive of research on correctional environments and programs – searching for "evidence-based" best practices, the American Institute of Architects (AIA) has also heightened its interest in "evidenced-based design". Architects clearly can contribute to good decisions being made during the design process – again, if the information is available, clear and convincing. The AIA has even begun referring to its committees as "knowledge communities" and "academies" – such as the Academy of Architecture for Justice – for which this application's principal investigator, Jay Farbstein, serves as the head of its research program (he will be succeeded by its co-principal investigator, Melissa Farling) and which has supported the development of the agenda leading to this proposal (and has found supplementary funding to that provided by NIC to expand the study and improve the quality and reach of its final report).

The AIA has launched certain initiatives aimed at developing the "evidence" for "evidence-based design". Principal among these efforts is the formation of the Academy of Neuroscience for Architecture (ANFA – no longer an AIA program, but originally started with a Latrobe Fellowship award, receives partial funding from the AIA, and incorporates national and local AIA leadership on its Board together with leaders in the neuroscience community).

ANFA's mission is:

*"to promote and advance knowledge that links neuroscience research to a growing understanding of human responses to the built environment.*

*The Academy benefits from the expanding body of research that has evolved within the neuroscience community in the last two decades, and the promise of even more in the coming century. Some observers have characterized what is happening in neuroscience as the most exciting frontier of human knowledge since the Renaissance. All humanity stands*

*to benefit from this research in countless ways still to be determined. The profession of architecture has become a partner in developing the application of this knowledge base in order to increase its ability to be of service to society."* [from the ANFA website]

The following is a summary of the key points from the theme presentation address at the 2003 AIA National Convention by Dr. Fred Gage (a member of the ANFA board and an advisor to the current project):

- The brain controls our behavior.
- Genes control the blueprints for the design and structure of the brain.
- The environment can modulate the function of genes, and ultimately, the structure of the brain.
- Changes in the environment change the brain.
- Consequently, changes in the environment change our behavior.
- Therefore, architectural design can change our brain and our behavior.

ANFA is concerned with developing knowledge about how architectural settings impact the experience of those who are in the setting; thus, it uses neuroscience concepts and techniques to investigate such things as how the human brain and mind form experiences; how these interactions affect behavior; and how changes in the attributes of the architectural setting can change experience. ANFA is engaged in research on environments for healthcare, aging, research labs, sacred spaces, and K-6 schools. Correctional environments are next on ANFA's agenda because these settings offer a natural extension of ANFA's work, for reasons cited above.

(It should be pointed out that while ANFA is not a formal sponsor of this research project, several of the team members are architects or neuroscientists affiliated with ANFA and the workshop follows a model developed by ANFA.)

Viewed from the opposite perspective, neuroscience can also be seen as a natural extension for environmental design research in correctional settings, since it allows understandings and insights about mental processes as well as behavioral and health outcomes which were not previously available. This application suggests that neuroscience concepts and methods offer tremendous promise for developing crucially important information of use to correctional facility planners and operators. They offer the ability to go deeper into the processes

and causes behind behavioral outcomes, understanding the way design and environment influence the mental structures and processes which result in behaviors (and even to find the reasons that the behaviors occur) – and thus present the opportunity to more effectively respond to and channel these behaviors in ways that are more positive for the individuals and institutions.

Specific topics that could be appropriate for investigation using neuroscience methods in correctional settings include:

- The impact of daylight and views, including the level of luminance and means of control.
- The effect of exposure to nature (e.g., views of greenery or water) on stress and aggression.
- The impact of the size of space in which one is confined (and the numbers of people one shares it with); density, crowding, etc., and the differential impacts and perceptions of crowding by various groups (male/female, etc.).
- The impact of ambient noise on stress and communications.
- The effects of environmental design features on the inmate/staff relationships.
- The impact of color on perceptions.

(Note that, as the project progressed, these topics were refined and collapsed into a smaller number.)

The eventual outcomes from this project are expected to be better, more evidence-based design decisions about correctional environments, more humane and effective correctional settings, and more satisfied clients of design services.

### Project Objectives

This project is intended to break new ground in correctional environment research. Because it is a leading-edge effort to explore new possibilities, the project's objectives may be considered ambitious. Key objectives are:

- to apply neuroscience research concepts and methods to correctional environments and to demonstrate the value of the kinds of information which can be developed

- to elaborate a list of hypotheses about the impact of correctional environments on inmates and staff which can be tested using neuroscience methods (this would constitute the development of a research agenda for this field)

- to prioritize the hypotheses by importance and feasibility – and to choose one or more to form the basis of a pilot research project

- to select or refine a set of neuroscience research tools appropriate to the selected hypotheses

- to conduct a pilot research project in one or two correctional settings, including data gathering and analysis

- to document the findings and disseminate them to the interested audiences – which include corrections administrators, planners and architects (for "evidence-based design") as well as to neuroscientists

### Implementation - Three Phases

In order to meet these objectives, the project will complete the following tasks – which are divided into three phases.

**Phase 1** focuses on defining an agenda for neuroscience research in correctional settings. The key activity in this phase is the **workshop** reported on here.

**Phase 2** will entail the conduct of a specific research study within one or two correctional settings (jails). This could be considered as a pilot study of the application of the concepts and methods, but it will also have the objective of developing actual, applicable findings (note that these findings may, however, be subject to verification in a broader study).

**Phase 3** will consist of documentation and dissemination of results.

## The Workshop

The workshop was held on October 5 and 6, 2006 in New Orleans. It was attended by 23 participants including five neuroscientists or psychologists, six correctional facility administrators and seven architects as well as the two project organizers, two senior managers from NIC, and the founding president of ANFA.

The workshop began on Saturday morning with an introduction to neuroscience and its applications to architectural environments by John Eberhard, Latrobe Fellow and Founding President of ANFA. This was followed by a presentation on the current state of research about the impacts of correctional environments on inmates and staff by Richard Wener, an environmental psychologist. Both presentations are

summarized in the next chapter and their PowerPoint slides are reproduced in the Attachments.

Following the introductions, the small groups spent the afternoon (and in some cases the evening as well) discussing their assigned topics. In each case, the neuroscientist began the group by giving an overview of how the brain is affected by the environmental conditions being discussed. The corrections administrator also spoke about how the issue is played out in the correctional setting, including their own experience and the opportunities and constraints in studying these factors in jails and prisons. Then the group explored the issue and elaborated possible hypotheses about the effects followed by discussions of how they could actually be studied in specific research projects - which settings with the jail or prison could be studied, which subjects, and which research techniques could be used. Each group's presentation is summarized in the next chapter and their PowerPoint slides (as used by three of the groups) are reproduced in the Attachments.

On Sunday morning, each group reported on their inquiries and described the most promising hypotheses and research projects. The whole group put questions to them and expressed their interests and priorities for research projects. This discussion is also summarized in the next chapter.

## Conclusions and Next Steps

### Selected research project(s)

- Based on levels of interest and likely feasibility, two projects were selected for further development and exploration:
  - A study of the impact of altered visual features on inmate and staff stress with an intake area. This will be explored with the Sonoma County jail.
  - A study of the environmental correlates of improving inmate-staff communications in coordination with the implementation of inmate behavior management in the Louisville, KY jail.

### Further applications

- The Academy of Architecture for Justice would be interested in seeing this approach applied to other justice facility types such as courts and law enforcement.

### Follow-up meeting

- The workshop sponsors suggested keeping in touch and possibly meeting again in a year to discuss the results and how to take them forward.

# Introductory presentations

## Introduction

The workshop began on Saturday morning with an introduction to neuroscience and its applications to correctional/architectural environments by John Eberhard, Latrobe Fellow and Founding President of ANFA. This was followed by a presentation on the current state of research about the impacts of correctional environments on inmates and staff by Richard Wener, an environmental psychologist. Both presentations are summarized below and their PowerPoint slides are reproduced in the Attachments.

## Neuroscience & correctional facilities

John Eberhard began his presentation with a discussion on the brain:

- **Brain vs. Mind**: The brain is an organ and the mind is a process. The mind uses the brain to do its processing – and it is constantly changing.
- **Review of brain**: There are 10 billion neurons held together by 90 billion glial cells. Neurotransmitters are the means for information to travel from 1 neuron to another. Once neurotransmitters are released into the synaptic cleft, they float around until accepted by a receptor.
- **Hearing**: The ears do not "hear", the brain does through the aural cortex. A person cannot hear everything or pay attention to everything – only about 30%.
- **Light**: The brain sees images through the visual cortex. Neurons are processed in 6 different areas: V1 – assembler; V2 – light and dark; V3 – superimposes a topographic map (form); V4 – color; V5 – motion; and V6 – direct activity of muscles (i.e. grasping)
- **Smell**: The nose smells odors via the olfactory cortex. One study showed that mothers who were blindfolded found 6 month old babies 100% of the time through smell, while fathers were successful only 70% of the time.
- **Crowding**: Crowding is related to proprioception – "6$^{th}$ sense" – the process that allows a person to know where he or she is in space or, for example, where one's hand is when reaching for a glass of water in the dark.

John further explained that neuroscience is the study of the mind and the brain. To illustrate the application of neuroscience to correctional environments, the following example hypotheses were presented for the workshop topics:

- The impact of **daylight** and **views** and the impact of **color on perception**:
  - Hypothesis: The retinal area of the visual cortex is influenced by daylight differently then by artificial light providing inmates with a greater sense of well-being

- Hypothesis: Ambient noise in excess of 60 db will increase cortical levels and consequently stress in staff and inmates.

- The impact of **size** and **density of space** in which one is confined leads to a sense of **crowding**:
  - Hypothesis: Inmates raised in North America will have a sense of crowding different than inmates from South America, because their secondary repertoires have been formed differently.

- The impacts of **isolation** and **solitary confinement** on prisoner behavior:
  - Hypothesis: When prisoners are deprived of stimulation from their environment or human contact, there is a strong inclination to hallucinations that trigger the amygdala to induce exaggerated anger.

The research that results from this workshop should follow the scientific process. The process has the following steps:

1. A problem or opportunity is recognized
2. A statement is prepared that describes the problem or opportunity in terms that fit a "paradigm"
3. Testable hypotheses are posed based on step 2
4. Experiments are done to confirm or deny hypotheses
5. Results are published and others attempt to duplicate the results obtained in step 4
6. Results can eventually be incorporated into objective statements and/or design guidelines

John Eberhard did caution the group to stay on topic. Therefore, in order to create a usable problem statement, the nature of our inquiry needed to be "bound":

- Do not address political or ethical issues
- Do not address management issues of jails except those related to architectural settings
- Do not address the social interactions between inmates and staff except those related to architectural settings
- Do not address special circumstances outside of normal confinement, such as riots, epidemics, floods.

**Impact of correctional environments on inmates & staff**

The complete title of Dr. Wener's presentation was: "Environmental Stressors in Correctional Settings: Behavioral, Psychological, and Psycho-physiological Responses to the Environment." An outline of the main points is presented below.

Dr. Wener reviewed **a list of stressors in correctional environments;** they include:

- Crowding
- Isolation
- Noise
- Poor Lighting – including a lack of daylight
- Lack of Access to Nature

Dr. Wener noted several things about all of these topics:

1. Everything is worse in a prison or jail

- Involuntary confinement
- Extreme exposure –
- Close, long term, few options
- Multiple stressors may increase impact of each (e.g., noise builds on crowding; they may work like drug potentiation)

2. There is a tendency to consider these factors only for inmates but staff suffers, too - from:

- lowered effectiveness
- lower satisfaction
- burn-out, turnover
- Designing a work environment, too - and OSHA standards may be relevant

3. These are difficult settings to study. Information is more limited than we would like.

- Limited access to settings – time consuming
- Informed consent issues
- True experiments (random assignment) almost impossible – Quasi-Experiments difficult
- But some environmental conditions are randomly distributed
- The most critical settings are the hardest to study (i.e., effects of isolation in supermax)

Dr. Wener then reviewed some of the research that has been done to date. Some effects have been studied more than others. There is a lot of research on **crowding**.

- More forces push to increase population than decrease it

- Confluence of interest of psychologists and the courts
- Paulus, McCain, Cox have done much of the work - but there are dissenters about crowding's level of impact (e.g., Gerry Gaes, ex head of BOP research)
- Issue is not whether crowding bad but how, where, and at what level
- Individual stress versus institutional stress

**Crowding issues** include:

- Density versus crowding; social versus spatial density - number of people versus area per person
- Planned prison density versus over rated planned or capacity
- 2 in single cell versus 2 in double cell
- 70 on unit built for 70 versus 70 on unit built for 35

There is also some research on **isolation** in prisons.

- Least access to worst cases (Supermax)
- Does not appear to be like lab stimulus deprivation
- Social deprivation
- Research on boredom as stressor
- Dissenter on level of impact – Peter Suedfeld
- "restricted environmental stimulation therapy"
- Issues of how bad, under what circumstances
- Inmate selection issue especially difficult
- Prospective research needed

Relatively little research on **noise** in prisons

- These are acknowledged to be noisy settings
- Noise is a psychological dimension - "unwanted sound"
- But measurements are purely physical
- Recent changes proposed to ACA Standards
- Emphasize other aspects – reverberation time - which may relate more to acoustic experience.

Rather little research on **lighting, view, color,** which are not generally recognized as critical issues

- Seen as "frill"
- Prone to fads (such as Baker-Miller pink)

Rather than reviewing all these factors, will focus on the least addressed areas (both in design & research) that have potential for large effects and note similarities and differences in impact of environmental stressors as a group. Thus, will focus on crowding, noise and isolation.

**Level of exposure** is important. Exposure to higher levels for longer time is more stressful. Need to look at:

- How long, how high?
- Dose/response?
- Linear versus step-function?

**Predictability and control** are also very important.

- Regular, predictable events are less stressful than random ones
- Controllable situations are less stressful than uncontrollable ones
- Difference between stressful and unstressful noise may be the presence of a switch, even if not used
- In some cases control defines the stress
- Self-controlled isolation is privacy; uncontrolled isolation is solitary confinement
- Because of nature of predictability & control and because of their importance, they may be particularly sensitive to neuroscience approach.

**Stress Impacts**

- Conditions are: perceived as stressful and unpleasant
- People try to escape or avoid them
- Or, in some cases, people habituate to them
- Nervous system reacts more at first than after a while
- But…even later, when less noticed, may still produce measurable physiological stress on some indices

**Stressors negatively affect:**

- Task performance (especially with complex tasks)
- Social behavior – withdrawal
- Motivation/frustration tolerance measures (i.e., proof-reading)
- Psycho-physiological indices of stress include blood pressure, cortisol, epinephrine (tricky to measure)
- Spatial behavior
- Sick calls, incidents
- Reduced positive behavior, such as use of programs

**Daylight & view are different:**

- Lighting – particularly daylight – and nature views are very different from the other factors in that it is not their presence but their lack which causes stress.
- They are not stressors as much as moderators of stress.

Stress buffers (Wells, Evans)

- Deal with the deviation of the built environment from a natural state – we evolved and mostly still live in settings with daylight & nature and their lack is particularly acute in jails which are almost universally bad at providing daylight and nature views.
- Why? Because…
  - Not seen as important (frills, trivial, amenities)
  - Not seen as worth the cost
  - May conflict with other goals
  - Windows are holes in secure barrier
  - Nature views can be seen as potential security breeches
  - Ability to communicate with those outside
- Growing evidence that daylight & nature may be very important in health and stress
  - Light intensity (and spectrum?) may affect mood, work, concentration, circadian rhythms, sleep (light/dark cycles). In extreme cases: SAD and phototherapy.
- But, we know very little about how inmates (and staff) fare who spend long periods mostly under moderate intensity fluorescents and in places without nature or nature views. These include inmates in interior units and possibly staff in central control.

Interesting new work on nature access & view

- "Biophilia" - considers the savannah as site of speciation (human origins)
- Most research on this topic is not in prisons. Early study by Ulrich has had huge impact.
- Large part of "evidence-based design" in health care
- Presence of view of nature versus view of wall in hospital room affected surgical outcomes, such as
  - Length of post-op stay
  - Amount of analgesics needed
- Other studies indicate effect on immune system, pre-operative stress, etc.
- Lack of daylight in emergency rooms related to increased negative effects, such as post-operative delirium.
- These are suggestive for correctional environments - but need to be studied.

Other non-prison research

- Increasingly solid evidence that nature view
  - reduces stress,
  - increase recovery from stress,
  - provide immunity from stress
  - increases recovery/restoration from mental fatigue

- Directed attention fatigue can affect irritability, impulse control, reflectiveness. Seems to have relevance for corrections (Kaplan, Parsons et. al, Hartig & Evans)
- Presence of even small patches of nature reduces level of aggression in public housing (Kuo & Sullivan).

### Why and how does this work?

- Directed attention (versus easy attention - fascination) as effortful & fatiguing
- Attention Restoration Theory
- Nature as inherently stress reducing
- Biophilia (E.O. Wilson)
- Nature as complex, involving, active, living, changing, social attractor
- Nature as a moderator or buffer of stress?
- Low income kids in crowded homes suffer less if access nature (Wells and Evans).

### Two studies of nature in prisons

- West found that the presence of nature views reduced illness reports – strongest effect in areas of highest turnover (high stress areas)
- Moore found that inmates with view of outside had lower blood pressure than inmates with view of internal courtyard
- Potential studies in correctional settings abound due to the wide variety of conditions in various institutions.

### Design Implications

- There is also a great deal of potential for creative designers who can address issues of providing daylight and nature views into an institution without compromising security.

### Future of "Neuro-Environmental Psychology?"

- Need to study in depth and with focus
- May start with why - but where, when and how may be more interesting
- Potential to help understand:
  - Limiting conditions
  - Interactions of factors
  - Ameliorations (how conditions can be improved)

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# Work Group Summaries - hypotheses and research projects

## Introduction

The core of the workshop was the time spent in small groups discussing possible hypotheses and research projects. Each group consisted of at least one architect, corrections administrator, and neuroscientist (the group assignments are shown in Attachment. All had been asked to select their topic in advance (though not all had) and to prepare for the discussion. The neuroscientist in each group made a brief introduction, giving an overview of how the brain is affected by the environmental conditions being discussed. The groups covered the following topics:

1. Visual factors - light, color, views, nature
2. The sonic environment - noise.
3. Crowding, density, size of space, isolation and sensory deprivation.
4. Inmate-staff relationships and communications.

Results from each group are outlined below - and their PowerPoint ™ presentations can be found in the Attachments.

## 1. Visual factors - light, color, views, nature

### The neuroscience of light and color

Julian Thayer gave the group an overview of how light and color stimulate the brain, including discussing various research findings and methods. The following summarizes his points, including discussion by the group:

- It is now possible to image the brain in action and to observe the effects of excitatory or inhibitory stimuli.
- In general, "the whole brain is involved in everything" and can't be oversimplified. It's more like a movie than a snapshot. It's dynamic and changes over time as we learn and adapt.
- The prefrontal area develops late and deteriorates early in live - it affects impulse control.
- There is a lot of research about sleep deprivation and its impact on gluco-steriods and glutamates which regulate the metabolism of sugars.
- Julian thought that light (and noise) in correctional settings might have a major impact on **sleep** deprivation and that, in turn, might have many behavioral outcomes.
- Circadian rhythms are regulated by light. There are cells in the brain which respond to light (and, in effect, dark), including wakefulness, tiredness and sleep patterns.
- Light, especially sunlight, regulates our biological clocks.
- Jet lag and SAD (seasonal affective disorder) are affected by changes or disruptions in light - intensity, duration and spectrum.

- Sleep quality has an important impact on health and performance. The transfer of information from short term to long term memory is affected by "slow wave" sleep which also affects problem solving ability. Sleep deficits can be made up.
- Note that sleep deprivation is well documented - but not in correctional settings.
- (Temperature was also mentioned as having an effect - even with short exposure - on irritability and aggression; with cold doing the opposite.)
- The ability to control environmental factors (or even the perception of control) was also discussed from a neuro890-biological perspective.
- Julian suggested that the way this works is through the amygdala which is a threat detector - flight or fight is it's default response. It has a negative bias, which is safer and thus was genetically selected for. The frontal lobe, where reason takes place, evolved to inhibit the raw response - when the situation is ambiguous, it is better to restrain from fighting. With sleep deprivation, the inhibitory function is diminished or lost.
- In an unsafe situation - which can be a jail or prison - one may be hyper-vigilant, always on guard. Thus, there are inherent or hard-wired aspects and also learned ones.

### Color and nature

- Variations include hue, intensity and value - muted versus strong colors.
- The color wheel can be related to an "emotional scale or wheel". Julian refers to Sokoloff's basic research. Factors include valance (positive or negative), arousal, aggressive/submissive.
- Among the factors in operation are a need for stimulation - variation and complexity are good, something to look at, especially something that changes - like a view of nature, fish tank, or video screen with changing images.
- It is thought that visual complexity and interest would help in recovery time from anger or stress (e.g., lowering blood pressure).
- With color response, there is some biological basis with a cultural overlay (e.g., can't escape the meaning of pink; plus no evidence for biological/neurological effect).
- We have associations with various colors - though they may not be universal. Red, black are powerful - but with different meanings in different times and places.
- "Colorful" versus dull or institutional is one contrast. May not be an issue of a single color, but the overall color field, relationships between or among colors, etc.
- We "read" the total environment as one instant gestalt - can ask what is the message that is being conveyed.

Dependent variables to measure (effects/outcomes):

- Physiological - heart rate, cortisol levels, "actigraph" [what is it?]
- Mood - subjective rating of "happiness" or other emotional factors
- Behavioral - incidents, fights, etc.
- Interaction quality - rated by participants
- Observer measures of the above.

Application to correctional settings

- The overarching goals for the correctional environment are: that it be manageable, healthy, with reduced stress and irritability. How can neuroscience help us understand how to achieve these goals - through the environment (or management)?
- There may be differences in what is needed or desirable for inmates versus staff. At night, want darkness for inmates to sleep - but staff must be able to see for work tasks and security. What's good for one group may not be good for the other.
- The manner and timing of cell checks needs to be considered - banging doors and shining lights on their faces can disturb sleep - and result in more irritable inmates the next day. And jail rules about sleeping during the day may keep them from making up the deficit.
- Inmates may even be more likely to be in jail in the first place due to unrecovered sleep deficits (which may be exacerbated by alcoholism).
- Linda Suvoy reported that when staff lowered lights in inmate areas during the day it had a calming effect.
- Jerry Clayton reported that in his jail, inmates could control the cell lights, though they could not turn it all the way out.
- It might be possible to experiment with two jail housing units - one with brighter light and the other darker - with intensity varied if possible according to the natural daily cycle. Could then measure mood/irritability, impulse control, and information processing or decision making.

Research Topic 1.1: Lighting at housing units

- Hypothesis – Lighting that follows natural circadian rhythms will result in better inmate sleep patterns which will, in turn, lead to greater calm, less irritability and aggression, and better program participation or work efficiency (for those in programs). [also improved inmate-staff communication in direct supervision settings?]
- Discussion of the Problem/Situation – In many correctional settings, sleep deprivation is exacerbated by a number of factors, one of which is lighting. There is too much light at night, not enough diurnal variation, and poor selection of the spectrum (not full spectrum, not enough access to daylight)

- Outcome Measures – PSQI (sleep quality index) assessment; paper and pencil tests of cognitive performance; physiological measures (actigraph); pulse rate (polar monitor); mood measures of stress, irritability, aggression, self-control or impulse control, and readiness to program.
- Test: two similar units in terms of layout/design and inmate classifications would be used. Lighting would be improved in one and not the other. Outcome measure would be taken pre- and post-changes.

Research Topic 1.2: Lighting, color and nature at intake areas [note that this hypothesis has been selected for implementation at the Sonoma County Jail and is described below in greater detail than the others]

- Initial Hypothesis – Access to natural (or full-spectrum) light, calming but interesting colors, and the introduction of natural elements such as house plants or fish tanks, will result in calmer, less stressed arrestees/inmates and staff, less aggression (fewer fights and incidents), and more pleasant interactions as well as more accurately and efficiently filled out booking forms.

- Discussion of the Problem/Situation – in the intake area, new arrestees arrive, sometimes for their first experience in jail. They may be under the influence of drugs and/or alcohol, may be mentally ill, and may be emotionally unstable or upset. The early hours of confinement are known to be among the most stressful for inmates – and are the time when suicide attempts are most common (though not necessarily in the intake area). The inmates also represent an unknown entity to the jail staff who do not know what behavior to anticipate from them. The result is a highly stressful situation for both groups – which it would be desirable to ameliorate through environmental design improvements.
- In general, "open booking" rooms, where inmates experience a "waiting room" type of setting (rather than holding cells – at least for most of the inmates who are cooperative) and are booked across an open counter (rather than through windows) are intended to improve the situation.
- However, it is assumed that even open booking settings may not be optimal in terms of the environmental design features and that targeted improvements could have the effect of reducing stress.
- Features which could be presumed to have this effect include:
  - Colors – calming (or even "colorful" ones that would communicate a less institutional approach).
  - Lighting – perhaps dimmer and more relaxing (depending on the existing situation – could also be quality in addition to quantity).
  - Views of nature – or of natural scenes, or perhaps the presence of live plants.
  - Use of natural and "softer" materials such as wood or perhaps fabric (as opposed to concrete and stainless steel).

  - Reduction in noise – more quiet, fewer unanticipated, abrupt noises.
- It is recognized that, for the research design, a specific feature (or sequence of features) will have to be selected for testing.

- Neuroscience Outcomes and Measures – the reduction in stress and increase in calmness could be expected to manifest itself in the following ways: reduced levels of cortisol (a drop of ____ points) and lowered heart rates (a reduction of _____ beats per minute).

- Other Measures – In addition, subjective measurements of stress would also be recorded. A question would be added to the inmate booking form asking them about their level of stress (preferably with an establish survey question) and staff would either be surveyed or interviewed about their levels of stress and their perceptions of the operation of the area and the behavior of inmates and staff. Incident reports for the area would also be reviewed for a period of time under the pre-test and post-test situations to record the number of incidents that occurred by type. In addition, staff would be asked to record the number of inmates present in the area when other measures are taken.

- The Hypothesis (Restated) – It is hypothesized that the introduction of _____ [selected feature] in the intake area will result in the reduction of inmate and staff stress, levels of anger and of incidents of aggression and violence. This is expected to result, for staff, in a significant reduction in cortisol levels and heart rate at the end of their shift. It will also result in lower reported stress for inmates and reduced levels of incidents.

- Research Design – a single (or a series) of interventions/ improvements will be made in the booking area at the Sonoma County Main Jail. Prior to the first one, staff will be pre-tested. At least ____ staff, selected from all shifts, would be included. They will have their cortisol levels measured (when and how many times needs to be determined) and will wear heart rate monitors (wrist bands – when and for how long needs to be determined) to establish their baselines. The same staff will be measured in the same way following each intervention. Similarly, inmate's reported stress levels will be measured before and after and incident reports will be tabulated before and after.

Research Topic 1.3: Lighting in program areas

- Hypothesis – Better lighting (appropriate levels, full spectrum, freedom from flicker and glare) will yield improved attention, concentration, participation and retention.
- Discussion of the Problem/Situation – Inmates who participate in programs should be receptive, attentive and able to learn at an optimal level.

- **Outcome Measures** – heart rate (desirable to be within certain ranges), performance measures of attention; continuous performance test, IAPS the International Affective Picture Set (a task performed under varied lighting conditions); subjective - ask whether tasks were more difficult or easier as well as pleasant.
- **Research Design** – There are two options - one would compare two otherwise similar classrooms with similar subjects and activities - but different lighting. The other approach would change conditions within the same classroom and outcome measure would be taken pre- and post-changes.

### Research Topic 1.4: Views of nature in "time out" or "quiet" room

- **Hypothesis** – A view of nature (even a picture) will have a calming effect on inmates in a high stress situation such as short term isolation compared with rooms that are without such a view or generally more featureless.
- **Discussion of the Problem/Situation** – Inmates are occasionally isolated for short periods of time when they are upset or acting out in order to calm them down. This issue could also apply to cells with or without windows - or with views of complex or changing scenes versus blank walls.
- **Outcome Measures** – length of time needed to calm down (for heart rate to return to a certain range; subjective - ask about stress, interest level, boredom, etc. "Anger management" measures. Staff could rate behavior. (that is when they are upset or acting out)
- **Test** – This could be compared either before and after in a single isolation room where a picture or mural was installed - or in two otherwise similar rooms, one with and the other without a picture (or for cells - with and without windows or with varying views - perhaps assigning one inmate sequentially to the rooms).

## 2. The sonic environment - noise

### Introduction

In preparation for the workshop, participants were given the following "thinking points":

- Ambient Noise – are there relatively quiet and or noisy parts of the jail – and what impact does this have on: communications, stress, ability of inmates to sleep (day or night), competition for control of TV channels or volume, etc.?

### The sonic environment

- Sound is energy, transmitted through the air (and through solid barriers as vibration).
- There are many sources of sound - and in the jail environment these include the people (who may sometimes be shouting), televisions or radios, intercoms, closing or slamming doors or

gates, flushing toilets, mechanical systems, alarms, ringing telephones, and the like.
- Sound can be described by the frequencies that compose it and its intensity (or loudness, measured in decibels). But the context of the sound is also important - a sudden loud noise (like a gate slamming at night) is more disturbing than a more constant but equally loud sound.
- Noise is unwanted sound - too loud, unpleasant, or at a time when it is disturbing (e.g., at night).
- The physical setting has a great impact on sound - hard surfaces reflect sound, soft ones absorb it. In many jails, there are only hard surfaces and the sound environment is both loud and confusing (due to multiple sources and long reverberation times).
- The acoustic environment also has a great impact on the ability to communicate (for speech to be heard and understood) and is thus critical to direct supervision and inmate-staff interactions (see below).
- Interventions to improve jail acoustics can include reductions in noise sources, the addition of sound absorbing or attenuating materials, and the introduction of sound masking or white noise.

### The neurobiology of sound

- Sound energy, transmitted through the ear, stimulates cells in specific regions of the brain.
- Brain cells accumulates the sound stimulation over a period of time - from 1 to 3 minutes. This impacts whether the sound is perceived as (for example) speech versus noise.
- Sound and noise levels can impact stress.
- Physiological responses include:
  - Vasoconstriction of the peripheral blood vessels
  - Pulse rate
  - Breathing rate
  - Galvanic skin response
  - Skeletal and muscular tension
  - Gastrointestinal motility
  - Blood and urine chemistry.
- There is some evidence that white noise can cause memory erasure - though it may be helpful for sleep.

### Research Topic 2.1: Improved acoustics in housing areas

- **Hypothesis** – An improved acoustical environment in a housing unit will lead to better inmate-staff communications, lowered stress levels for all, and better sleep for inmates. [This hypothesis could benefit from being more neuroscience specific.]
- **Discussion of the Problem/Situation** – The acoustic environment of housing units has a considerable impact on the achievement of correctional goals for manageability, communications, program participation, and reduced stress and violence. When it is quieter,

it is easier to communicate, messages are understood better, stress is reduced and sleep patterns improve. It is relatively easy and low in cost to introduce sound-absorbing materials on ceilings and the higher parts of walls though, if in reach, they need to be protected. Sound sources also need to be controlled - television and paging system volumes, silencers on doors or gates, and toilet flush valves.

- Outcome Measures – for communications: subjective reports by inmates and staff; for stress: cortisol levels, subjective reports, and behavioral outcomes such as incidents and violence; for sleep patterns, see topic 1.1.
- Test – Two identical housing units with same classification of inmates - or before and after in same unit. Acoustic treatment applied sufficient to effect a signification reduction in sound levels. Actual sound levels and all outcome variables measured before and after.

## 3. Size of Space, Crowding, Density, & Isolation

### Introduction

In preparation for the workshop, participants were given the following "thinking points":

- Size of space, density and crowding – if the jail experiences crowding (substantially more inmates than an area was designed or intended to accommodate), what is the effect – what are the observable outcomes (stress, fights, noise) – what has been the jail's response (rationing of resources, partial lockdowns, etc.)?

- Isolation – are there areas in your jail where inmates are separated for a considerable period of time from others – how long, what are they like – may sensory deprivation pertain – and to what effect? If there are negative impacts, what could be done to mitigate them?

### Size of space, density, crowding and isolation

The group began with a discussion about size of space, density and crowding:

- Does size of space in the housing area matter?
  - Are smaller units better? Will smaller living units be more inmate focused or easier to insure safety?

- With a larger size unit (staff-inmate ratio) will staff be more distant? The ideal span of control is affected by classification, design, mission and supervision style.

### Application to correctional settings

The design of correctional environments should keep in mind the following goals:

- Enhance inmate management within a safe and secure environment.
- People should leave in no worse condition than they came: physically, mentally or sociologically (identify self as "criminal"?)
- Accept that direct supervision works best for most inmates.
- Direct supervision gives privileges – as part of the expectation of normal behavior – lose them if misbehave.
- There exists an expectation of compliance with rules.
- Institutions should address recidivism:
  - education programs (GED, etc.)
  - substance abuse treatment
  - anger management
  - impulse control
  - criminal thinking

Following are discussion points which ultimately led to the hypotheses:

- Traditionally, operators have assumed that having one inmate per cell was optimal. Recently, more facilities have accepted and endorsed multiple housing with 2 through 8 inmates in a room or open dorms seen as acceptable or even desired, making this an issue worth testing.
- Direct supervision depends on officers knowing who inmates are, inmates' needs, problems, etc. Bigger units (more inmates) increase the cognitive load on the officer making proper knowledge more difficult. What is the requisite number of inmates that a housing unit officer can be expected to manage effectively? One of the most frequently asked questions – & major driver of facility design - is "what is the optimal number of inmates per unit?" (varies with expectations placed on the officer)
- Inmates are likely to be most anxious in intake – just off the street, possibly intoxicated, surrounded by unknown people and processes. How does the design of the intake-booking area affect these initial responses?
- Isolation from people, activities, and variety of stimulation can lead to worsening mental health.

### Research Topic 3.1: Size of space, crowding & density

- **Hypothesis 3.1a** – As the number of inmates per cell/bedroom increases inmates will feel less privacy, increased stress, higher levels of aggressive behavior (and increased assaults, vandalism); and (indirectly) staff stress will be greater.

- **Test** – Cortisol levels, self-reporting, observation and misconduct and critical incident reports can all be utilized for measurements.

- **Hypothesis 3.1b** – As number of inmates per unit increases, officers will have less detailed knowledge of inmate names, faces, issues – be less able to predict and diffuse problems.
- **Test** – Testing will include physiological measures and absenteeism reports. Staff knowledge can be tested by asking each staff member to view photos and to identify inmates on their unit.

- **Hypothesis 3.1c** – Design of intake booking (furniture, color, light, space) can reduce fear, shame, stress, anger in inmates, without reducing security and with positive effects for behavior in the facility after booking.
- **Test** – Stress levels in old and modified booking areas will be tested.

Research Topic 2: Isolation

- **Hypothesis** – Greater degrees of isolation and longer periods of isolation lead to progressive deterioration of mental health, increased anger and aggression toward staff, increased property destruction, and increased suicidal behavior.
  - Design and technological interventions (light, color, virtual access to settings) can mitigate these problems
- **Test** – Cortisol levels, self-reporting, medical reports, observation and misconduct and critical incident reports can all be utilized for measurements.

## 4. Inmate-staff relationships

Introduction

The participants were asked to review and think about the following questions in preparation for the workshop:

- What are the design impacts on inmate-staff relationships?

- Does the jail use direct supervision, and if so, to what extent do inmates and staff communicate directly?

- If not, how much and what quality of communication is there?

- What is the impact of design on amount and quality of communication and what are the outcomes?

Neuroscience and empathy

Jonas Kaplan began the discussion by explaining the neuroscience applications and measuring techniques which could be applicable to understanding how the brain processes relationships and communication

between people. The following is a summary of the discussion by Jonas and the group:

- 10 years ago, a new kind of neuron was discovered in monkeys – these are called mirror neurons, and have since been confirmed to exist in humans as well. A **mirror neuron** is a neuron which fires both when an animal performs an action and when the animal observes the same action performed by another animal. Thus, the neuron "mirrors" the behavior of another animal, as though the observer were himself performing the action. The brain maps someone else onto the self. It is believed that this is how we understand others – through empathy.
- Cooperation breeds empathy and people who are more empathetic have more mirror neurons.
- An increase in mirror neuron activity correlates with more empathy. Children with autism have impaired mirror neurons.
- This mirror neuron activity can be measured using transcranial magnetic stimulation (TMS).
- TMS is a noninvasive procedure in which an electromagnetic coil is used to briefly stimulate specific areas of the brain. The procedure is done while the subject is awake, and no anesthesia is needed. TMS is a safe investigative tool to study normal and abnormal brain functioning. When people are stimulated over the motor control regions of the brain, a small twitch may be observed in the hand opposite to the stimulation. The size of these twitches reflects how activated a person's motor cortex is. Thus, when observing others, larger twitches are produced since observing action leads to activation of mirror neurons.
- Jonas also suggested testing cognitive performance. For example, staff may view photos of inmates they supervise or video of situations while brain activity is measured using functional magnetic resonance imaging (fMRI) and/or EEG. fMRI measurements would most likely be for staff only due to the non-portable nature of the equipment.

### Application to correctional settings

- Scott Hoke commented that positive contact and communication is the goal of the inmate-staff relationship. It is believed that this positive relationship can decrease levels of disorder within the jail. The National Institute of Corrections is currently implementing and Inmate Behavior Management Program to operationally address management issues.
- Therefore, the question became what *architecturally* impacts these relationships? Further discussion investigated the actual architectural elements of the jail - for example, the indirect supervision model with the correctional officer on an elevated platform.
- It quickly became evident that the housing unit and dayspace would be the most conducive to research. The group did discuss other areas such as intake or booking, however, logistical issues such as

consent and state of the individual being processed, made those areas less ideal for the research.

- The work group proposed that the increase in positive interaction between the staff and the inmates promotes easier management of the inmates and a better environment for both groups of users. It is believed that direct supervision is not just about the presence of the officer. The success of the outcomes is determined by the actual

  interaction. Is it beneficial and possible to modify jails which have not been designed as direct supervision jails, so that they can benefit from more effective direct staff-inmate interaction?
- Architectural features which, if present, may have an impact on staff-inmate interaction include:
  - physical barrier (low or high opaque wall, doors)
  - transparent glass barrier
  - fixed staff post - elevated platforms or podiums for staff
  - size of unit - ratio of staff to inmates
- Demographic factors may also have an impact on staff-inmate interaction including:
  - race
  - gender
  - general population
  - administrative segregation populations
  - mental health populations
  - substance abuse populations

Research Topic 4.1: Prosocial inmate-staff interaction

- Hypothesis 4.1a – Increase of prosocial inmate-staff **contact** reduces inmate **disorder** because of increased activity of mirror neurons. (general population)
- Test – Testing is proposed to occur prior to doors being opened and after doors are opened in the 24-30 bed units at the Louisville Metro Jail in Kentucky where the Inmate Behavior Management Program for Large Jails is currently being implemented, thereby potentially increasing inmate-staff interaction. A number of staff (and inmates) from all shifts will be included. Measurements will include TMS, fMRI, EEG and testing of cognitive performance. Staff would also be asked to watch videos and document reaction to photos of facial emotions. Testing at the Sonoma County Jail in Santa Rosa, California, a direct supervision jail, is also proposed. Data from the 2 jails would then be compared. Levels of inmate disorder would be additionally measured with misconduct reports, critical incident reports, verbal reports and observation.

- Hypothesis 4.1b – (If Hypothesis 4.1a is successful) Increase of prosocial inmate-staff **contact** reduces inmate **turnover** and **absenteeism** because of increased activity of mirror neurons.

- **Test –** Following testing for Hypothesis 1a, jail staff reports for turnover and absenteeism would be reviewed and compared before and after architectural interventions or modifications.

- **Hypothesis 4.1c –** (If Hypothesis 4.1a is successful) Increase of prosocial inmate-staff contact is modulated by staff-inmate ratio. *(Crowding may also be an issue with the size of the population).*
- **Test –** Similar to Hypothesis 1a test with additional cognitive performance testing – i.e. staff is shown images of inmates and asked to identify the inmates in the unit that they supervise.

- **Hypothesis 4.1d –** (If Hypothesis 4.1a is successful) Increase of prosocial inmate-staff contact reduces inmate disorder because of increased activity of mirror neurons. (gender)
- **Test –** similar to Hypothesis 4.1a test.

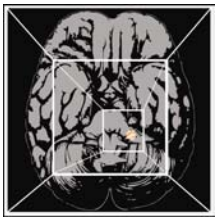
- **Hypothesis 4.1e –** (If Hypothesis 4.1a is successful) Increase of prosocial inmate-staff contact reduces inmate disorder because of increased activity of mirror neurons. (race)
- **Test –** similar to Hypothesis 4.1a test.

- **Hypothesis 4.1f** – (If Hypothesis 4.1a is successful) Increase of prosocial inmate-staff contact reduces inmate disorder because of increased activity of mirror neurons. (mental health)
- **Test** – similar to Hypothesis 4.1a test.

- **Hypothesis 4.1g** – (If Hypothesis 1a is successful) Increase of prosocial inmate-staff contact reduces inmate disorder because of increased activity of mirror neurons. (substance abuse)
- **Test –** similar to Hypothesis 4.1a test.

**Research Topic 4.2: Areas with limited inmate-staff interaction (i.e. administrative segregation)**

- **Hypothesis –** (If Hypothesis 1a is successful) Inmates that cannot live in **group settings** have **impaired mirror neurons**.
- **Test** – Mirror neuron activity will be measured and compared with results from Hypothesis 1a and others.



# Summary of large group discussion

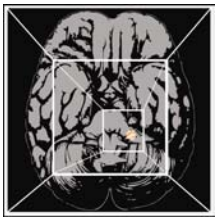
## Introduction

This chapter summarizes the concluding discussions held in the large group on Sunday morning, following the small group presentations.

## General discussion points

The group was asked to help set priorities from among the research topics identified. Here are some of the points raised:

- One participant asked what the criteria should be - importance, likelihood of funding, additional support needed? Low cost (both for the research and for any physical interventions) was also an issue.
- The applicability in direct supervision jails was questioned, but it was felt that all or almost all the research topics could be relevant to all types of jails (and direct supervision represents only a small percentage). Coordination with NIC's inmate behavior management initiative was also felt to be relevant to all types of jails.
- Some participants suggested selecting a project that gives the best chance of clearly demonstrating what can be done in the field - one that offers good physiological measures (such as cortisol for stress) and a clear link to manipulated architectural variables.
- In general it was felt that whatever would be the most widely applicable should be given a high priority.
- Should the project look at comprehensive changes all at once - or focus on a more finite change where we could be more certain that it is responsible for observed effects? The sense was that it was better to focus on changing one variable at a time, which is "more scientific" - though others felt that it was possible to study more than one variable at a time, but they would have to be disaggregated with further research. More focused projects may be better able to attract funding.
- While some felt that a high priority is studying staff-inmate interaction, it was also pointed out that it may be harder to measure.
- Other participants were most interested in visual and auditory issues.
- It was suggested that whatever is studied, it should combine neuroscience measures with more traditional behavioral ones.
- Finding a facility willing to (or better, interested in) participation is a key factor.
- Among the group members, offers of participation were received from Hillsborough and Sonoma County as well as the Bureau of Prisons. Louisville, Kentucky was also mentioned - it is indirect supervision and implementing inmate behavior management with the goal of increasing contact between staff and inmates.



## Conclusions & next steps

### Selected research project(s)

- Based on levels of interest and likely feasibility, two projects were selected for further development and exploration:
  - A study of the impact of altered visual features on inmate and staff stress with an intake area. This will be explored with the Sonoma County jail.
  - A study of the environmental correlates of improving inmate-staff communications in coordination with the implementation of inmate behavior management in the Louisville, KY jail.

### Potential impacts of this work

- One enthusiastic participant felt that we might be witnessing the beginning of another wave of correctional reform through the application of neuroscience.

### Further applications

- The Academy of Architecture for Justice would be interested in seeing this approach applied to other justice facility types such as courts and law enforcement. This would require a somewhat different funding stream.

### Follow-up meeting

- The workshop sponsors suggested keeping in touch and possibly regrouping in a year to discuss the results and how to take them forward. One possibility is to meet in New York in September 2007 in conjunction with the AAJ's annual conference.

# Attachment 1: Research Program Summary

# PROGRAM SUMMARY

Research has demonstrated that correctional environments can have positive or negative impacts on inmate behavior, contributing to or inhibiting the achievement of facility operators' objectives – such as safety, security, order, freedom from assaults and destruction of property. These can be influenced by environmental factors such as crowding, space allocations, availability of resources, levels of noise, natural light, and other factors.

Agencies such as NIC and NIJ have been supportive of research on correctional environments and programs – searching for "evidence-based" best practices. Recently, the American Institute of Architects (AIA) has also heightened its interest in "evidenced-based design". Architects clearly can contribute to good decisions being made during the design process – if the information is available, clear and convincing.

Now, to help develop such information, **NIC has approved a "cooperative agreement" providing funds for a pilot study of the application of neuroscience concepts and methods to correctional environments. The AIA and Turner Construction have also agreed to provide financial and logistical support.**

Specific topics that will be considered for investigation include:

- The impact of daylight and views, including the level of luminance and means of control.
- The effect of exposure to nature (e.g., views of greenery or water) on stress and aggression.
- The impact of the size of space in which one is confined (and the number of people one shares it with), density, crowding, etc.
- The impact of ambient noise on stress and communications.
- The effects of environmental design features on inmate-staff relationships.
- The impact of color on perceptions.

The eventual outcomes from this project are expected to be better, more evidence-based design decisions about correctional environment design and operations, more humane and effective correctional settings, and more satisfied clients of design services.

The project will complete the following tasks in approximately thirteen months, from September 2006 to September 2007.

Phase 1 focuses on defining an agenda for neuroscience research in correctional settings. This will be achieved in a workshop bringing together neuroscientists, architects and correctional administrators.

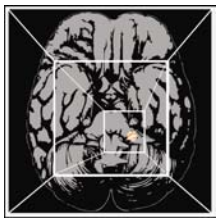
Phase 2 entails the conduct of a specific research study within one or two correctional settings (jails). This will be a pilot study of the application of the concepts and methods, but it will also have the objective of developing actual, applicable findings (findings will, however, almost certainly be subject to verification in a broader study).

Phase 3 consists of documentation and dissemination of results.

**Additional support is being sought to broaden the scope of the study to include more topics and facilities – and to improve the quality and distribution of the results.**

## Attachment 2: Invitation letter with agenda, participant list & work group assignments

**neuroscience and correctional facility design workshop:**
understanding cognitive processes in correctional settings



invitation

October 7-8, 2006
Marriot New Orleans
at the Convention Center
859 Convention Center Blvd
New Orleans, LA

Dear Colleague:

You are cordially invited to participate in a workshop exploring the application of neuroscience concepts and methods to understanding the impact of correctional environments on inmates and staff. The workshop will bring together neuroscientists, correctional facility administrators, and architects who design correctional facilities (please refer to the attached list of participants). In the workshop, we will consider the potentials for applying and developing knowledge that can improve the safety, humanity and effectiveness of correctional facilities.

We expect that the workshop will take the first steps toward defining a research program in this area – and lead to field research in one or more correctional settings. The program is sponsored by the National Institute of Corrections (NIC), the American Institute of Architects (AIA) and its Academy of Architecture for Justice (AAJ), and Turner Construction (and further support is being solicited).

The workshop is being organized with the cooperation of the Academy of Neuroscience for Architecture (ANFA). In previous workshops, ANFA has focused on environments such as healthcare, aging, classrooms, spiritual settings, and neuroscience laboratories. Our workshop will follow the ANFA model (see the attached draft agenda). A number of promising focal topics are suggested in the agenda. Please let us know if one or more of them is of particular interest to you. We will be discussing these topics, the impacts they have on inmates and staff, the ways in which neuroscience may be able to illuminate them, and specific hypotheses about how they work and can be studied. At the conclusion of the workshop, a research program will be selected for implementation in the balance of the study.

We look forward to your participation in this exciting exploration! Please feel free to call Jay Farbstein with any questions.

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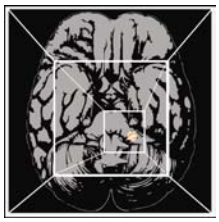
**neuroscience and correctional facility design workshop:**
understanding cognitive processes in correctional settings



agenda

Saturday, October 7, 2006

8:00 am – 12:00 pm - **Introductions**

8:00 am Continental breakfast
8:30 am Welcome/introductions
9:00 am Background and purpose of workshop
9:30 am Presentations:
- overview of current corrections environment research
- introduction to neuroscience and ANFA research
- review research issues/topics:
  - daylight and views, including level of luminance and means of control
  - size of space, density, crowding
  - ambient noise
  - design impacts on inmate-staff relationships
  - isolation & solitary confinement

11:00 am Work group explanations and assignments. Groups will move into separate areas for their discussions.

12:00 pm Reassemble for buffet lunch and work group discussions

1:00 pm - 5:30 pm - **Work groups**

- discuss topic area – what is the problem? what do we know now? what would we like to know?
- what are the correctional environment correlates? the neuroscience correlates?
- formulate hypotheses about how the environment impacts outcomes
- discuss how to test the hypotheses – what methods, what measurements?
- are there logistical, security or other constraints that need to be considered?
- prepare presentation for Sunday

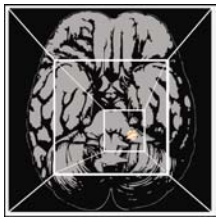
Sunday, October 8, 2006

8:30 am – 12:30 pm

8:30 am Continental breakfast
9:00 am Opening Session
- Each group will have 30 minutes to report on results of their collaboration

11:30 am Discussion based on group results
- set priorities for field research
- discuss data gathering issues and logistics
- identify candidate facilities
- discuss next steps – including publishing results of workshop & distribution
- identify opportunities for further support and funding

12:30 pm Adjourn



**neuroscience and correctional facility design workshop:**
understanding cognitive processes in correctional settings

## participants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*Research Associate*, Academy of Neuroscience for Architecture
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Scott Hoke
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sahoke@cedarcrest.edu

Ginny Hutchinson
*Chief, Jails Division,* National Institute of Corrections | Longmont, Colorado
vhutchinson@bop.gov

Leslie Johnson
*Administrator*, Curry County Adult Detention Center | Clovis, New Mexico
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Kris Keller
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Colonel David M. Parrish
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*Senior Vice President, Justice Director,* HOK, LP| Dallas, Texas
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Captain Linda Suvoy
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**Julian F. Thayer, PhD**
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**Richard Wener, PhD**
*Associate Professor of Environmental Psychology*, Department of Humanities and Social Sciences, Polytechnic University | Brooklyn, New York
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**Len Witke, AIA, NCARB**
*Manage, Public Architecture*, Mead & Hunt, Inc. | Madison, Wisconsin
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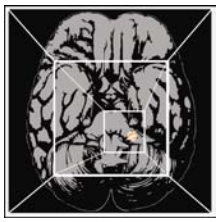
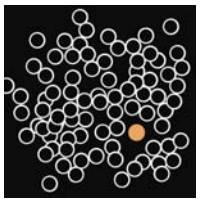


**neuroscience and correctional facility design workshop:**
understanding cognitive processes in correctional settings

## Working Group Assignments

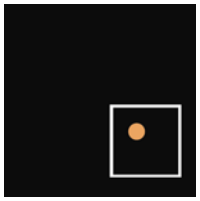
### Daylight / Views / Color / Exposure to Nature

Jay Farbstein
Julian Thayer
Mary Galey
Linda Suvoy
Jerry Clayton
Susan Goltsman



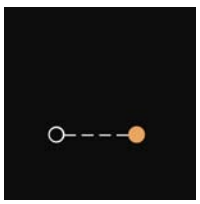
### Size of Space / Density / Crowding & Isolation/Sensory Deprivation

Rich Wener
Allen Selverston
Mark Goldman
Len Witke
Leslie Johnson
Ginny Hutchinson



### Ambient Noise

Beverly Prior
Eve Edelstein
Ed Spooner
David Parrish
Kris Keller



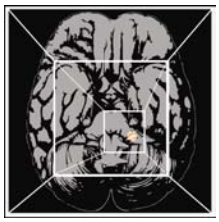
### Inmate / Staff Relationships

Melissa Farling
Jonas Kaplan
Ken Ricci
Scott Hoke
Tom Allison

**all groups (roaming):**
John Eberhard

## Attachment 3: Preparation letter with instructions

**neuroscience and correctional facility design workshop:**
understanding cognitive processes in correctional settings



preparations

September 25, 2006

Dear Colleague:

In preparing for our upcoming workshop, we have drafted some questions to think about. As you saw in agenda sent with your invitation, we have identified or questions which may be appropriate for study. We started with five topics – and have added one or two – though likely we will eliminate or recombine them back down to five. They are:

- The impact of the size of space in which one is confined (and the number of people one shares it with), density, crowding.
- The impact of isolation and sensory deprivation.
- The effects of environmental design features on inmate-staff relationships.
- The effects of ambient noise on stress and communications.
- The impact of daylight and views, including level of luminance and means of control.
- The effect of exposure to nature (e.g., views of greenery or water) on stress and aggression.
- The impact of color on perceptions.

We might combine the last three (all visual) or put isolation together with crowding since, in some ways, they are each other's opposite, or combine noise with inmate-staff relationships.

We would like to know which of these topics interest you the most. If you had to choose one or two to focus on for the workshop which would they be? If you all choose the same one, we may have to make arbitrary assignments – but we will try to accommodate you while ensuring that each small group has at least one administrator, architect, and neuroscientist. Please email us this week listing your top interests.

As you think about these topics, from the perspective of your own particular roles, please consider the following: What do we already know (from experience and/or research) about the topic and its impacts? What kinds of decisions are being made operationally and in design that impact this area? What do we need to/want to learn to help make better decisions? What are the neuronal (as well as behavioral, cognitive, and emotional) factors which are important in understanding what people experience and do in jail (do we know what parts of the brain are involved)? Would we expect differences among jails, prisons and juvenile facilities (given age, seriousness of offense, time exposure, relative restrictiveness of setting)? Differences between males and females? Specifically, please be prepared to discuss the following, depending on your role:

- Corrections Administrators – what is the situation in your facility – what are the conditions, what are the impacts, what are the problems (if any) your people experience, and what would you like to have happen?

- **Architects** – what do you see as the range of possible environments or design features that affect this area – what are the design choices you face, what research findings would contribute to your discussions with clients and owners?

- **Neuroscientists** – come prepared to explain to the non-scientists in your group the brain processes (including cognitive) that relate to this topic and how it might be studied in the restricted and secure jail environment (and with subjects who might be skeptical of our allegiances and motives)? Are there laboratory experiments which could contribute?

In addition, here are some "thinking points" about each of the topics that I would ask you to ponder.

- **Size of Space, Density and Crowding** – if the jail experiences crowding (substantially more inmates than an area was designed or intended to accommodate), what is the effect – what are the observable outcomes (stress, fights, noise) – what has been the jail's response (rationing of resources, partial lockdowns, etc.)?

- **Isolation** – are there areas in your jail where inmates are separated for a considerable period of time from others – how long, what are they like – may sensory deprivation pertain – and to what effect? If there are negative impacts, what could be done to mitigate them?

- **Design Impacts on Inmate-Staff Relationships** – does the jail use direct supervision – and, if so, to what extent do inmates and staff communicate directly – and if not how much and what quality of communication is there? What is the impact of design on amount and quality of communication and what are the outcomes?

- **Ambient Noise** – are there relatively quiet and or noisy parts of the jail – and what impact does this have on: communications, stress, ability of inmates to sleep (day or night), competition for control of TV channels or volume, etc. ?

- **Daylight, Views & Color** – does the jail have windows or skylights – and does it make a conscious use of color – in the areas where inmates spend most of their time – and to what effect? Is the diurnal cycle (sunrise to sunset) appreciable by inmates and staff – or do they spend the bulk of their time under artificial lighting?

- **Exposure to Nature** – if there are windows, what is the view (light-well, other building, or is something natural visible)? Do inmates get outside – into an area with greenery – or just hard pavement? Is there any intuitive sense of the impact of these variations of exposure?

We expect to send out additional materials, including participant bios and some reading materials (for the airplane most likely) in a few days. We are excited about the workshop and look forward to seeing you there.

Best,

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310.889.0199

Melissa Farling, AIA, LEED, AP
Gould Evans Associates
Phoenix, AZ 85013
602.234.1140

# Attachment 4: Participant Biographies

Jerry Clayton
*Retired*, Washtenaw Sheriff's Office | Ann Arbor, Michigan
jclayton@lamberthconsulting.com

Jerry is a criminal justice consultant and retired twenty year veteran of the Washtenaw County Sheriff's Office in Ann Arbor, Michigan. Jerry's career experience with the Sheriff's Office includes assignments/appointments as a Corrections Officer, Deputy Sheriff, Shift Sergeant, Operations Lieutenant, County Court Security Commander, SWAT Team Commander, Corrections Division Commander and Police Services Division Commander.

Jerry has been a certified criminal justice trainer and instructor for more than sixteen years, specializing in a multitude of subject areas including; use of force disciplines, physical training, special weapons and tactics, cultural diversity, preventing racial profiling, and in the areas of staff management and supervision, developing customer service delivery strategies, and organizational leadership. Jerry has designed and instructed a variety of training programs and workshops including; Court Security Officer Training, Cultural Diversity Training for Law Enforcement Professionals, Preventing Biased Police Practices (Suite of training courses for Executives, Officers, Front-line Supervisors, Field Training Officers), Enhancing Law Enforcement and Community Trust Workshop, Civility Workshop. He provides consulting services as a contracted Technical Assistance service provider and instructor for the U.S. Department of Justice-National Institute of Corrections, assisting in the development and delivery of various training curricula to local, state and federal correctional agencies throughout the United States.

Jerry is a partner and Vice President of Training and Community Engagement with Lamberth Consulting, LLC, a company focused primarily on providing statistical analysis, training and engagement services targeting issues of racial profiling and biased enforcement throughout the United States and Europe.

Jerry is a former member of NOBLE, IACP, and the National Sheriff's Association.

Jerry attended Eastern Michigan University on a football scholarship and majored in Organizational Communication with a minor focus in Training Design and Development. He graduated from the Eastern Michigan School of Staff and Command and from the SCH Executive Leadership program.

John P. Eberhard, FAIA
*Founding President*
Academy of Neuroscience for Architecture | Washington, DC
Jpeber@aol.com 202.478.2443

John P. Eberhard, FAIA is currently a senior consultant to the Academy of Neuroscience for Architecture and is the author of articles on the subject of architecture and neuroscience. He has two books in preparation on the same topic.

From 2003 to 2005 he served as the Latrobe Fellow of the College of Fellows of the American Institute of Architects, the Founding President of the Academy of Neuroscience for Architecture and as Visiting Scholar in the Division of Biology at the University of California at San Diego.

He was the Director of Research Planning for the American Institute of Architects in Washington, DC. from 2000 to 2003.

He has served as Director of Research of the Sheraton Hotel Corporation (1960-63); Director of the Institute for Applied Technology at the National Bureau of Standards (1964-68); President of the AIA Research Corporation (1973-78); and Executive Director of the Building Research Board of the National Academy of Sciences (1982-87).

A graduate of the University of Illinois in architecture, and the holder of a Masters in Industrial Management from the Sloan School at MIT, his academic career has included: an appointment as adjunct professor in the Sloan School at MIT (1959-63), Dean of School of Architecture and Environmental Design at SUNY-Buffalo (1968-73), and Head of the Department of Architecture at Carnegie Mellon University (1989-95).

From 1995 to 1998, as a consultant to the American Architectural Foundation in Washington, he immersed himself in learning about developments in the field of neuroscience.

He is a member of the Cosmos Club in Washington, DC.
and a member of the Society of Neuroscience.

**Eve Edelstein, PhD, (*Neuro*), M. Arch, F-AAA, Assoc. AIA**
*Visiting Scholar,* University of California San Diego | San Diego, California
*Adjunct Professor*, NewSchool of Architecture & Design | San Diego, California
*Research Associate*, Academy of Neuroscience for Architecture
neuroarchitecture@yahoo.com 858.509.4949

Dr. Edelstein has Doctorate in Neurophysiology awarded for clinical research at the National Hospital for Neurology & Neurosurgery, Institute of Neurology, University College London. She is a Visiting Scholar at the University of California, San Diego, developing research interests and the outreach programs for the American Institute of Architects Academy of Neuroscience for Architecture. Dr. Edelstein has a Master of Architecture, and received the AIA Henry Adams Certificate of Merit in Excellence in the Study of Architecture. She is a Principal Investigator for the AIA College of Fellows Latrobe Fellowship, and teaches the first Neuroscience for Architecture Program at the NewSchool of Architecture & Design.

Dr. Edelstein's clinical service and research involved the development of clinical programs and electrophysiologic techniques to assess patients with hearing and balance disorders. Her contributions to the California State Department of Health Services assisted in the creation of the world's largest newborn and infant hearing screening program.

Her research includes single cell animal models and clinical site-of-lesions studies of the auditory feedback system's control of signal in noise perception at the National Hospital for Neurology & Neurosurgery, London, and the Massachusetts Eye and Ear Infirmary, Boston. She conducted large-scale studies in noise induced hearing loss for the US Naval Medical Center, San Diego.

Dr. Edelstein is a Principal Investigator for the 2005-2007 AIA Latrobe Fellowship. She received the Academy of Architecture for Health Foundation award to develop an interactive knowledge base to improve use of biological and medical findings that inform design. She presents the annual Neuroscience Forum at the AIA Academy of Architecture for Health and American Society for Healthcare Engineering conferences.

Eve directed studies by NewSchool students to propose designs for laboratory improvements at the Salk Institute, and universal access designs for the Interwork Institute, College of Education, San Diego State University.

Selected Work:

Edelstein, E A. White Paper: Translational Design: The Relevance of Neuroscience to Architecture. PDC American Society for Healthcare Engineering. 3/1/2006. Access at www.ASHE.org

Edelstein, E A. Update on Neuroscience and Architecture: Translating Science into Design. AIA/AAH Update on Neuroscience and Architecture. 2/10/2006. Access at www.AIA.org

Edelstein, E A. Translational Design. Academy of Neuroscience Architecture Workshop on Health Care Architecture. Woods Hole, Access at www.ANFArch.org July 20, 2006

Jay Farbstein, PhD, FAIA
*Principal*, Jay Farbstein & Associates | Los Angeles, California
*Chair*, AAJ Justice Facilities Research Program
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A principal of Jay Farbstein & Associates, Inc., Dr. Farbstein has more than 30 years of professional experience and is nationally recognized for his contributions in the field of facility planning, programming, and post occupancy evaluation research. He has led or participated in numerous building research and evaluation projects, include a 15 year-long series of assessments of U.S. Postal Service facilities, the ORBIT-2 study of offices and information technology, development of the Serviceability Tools & Methods, as well as methods for evaluating correctional facilities for the National Institute of Corrections (and numerous evaluations of jails, prisons and juvenile facilities), the Florida A&M University School of Architecture, Job Corps training centers for the U.S. Department of Labor, and many others.

Dr. Farbstein has published widely on facility programming and evaluation, including *People in Places* (Prentice Hall), *Correctional Facility Planning and Design* (Van Nostrand Reinhold), and articles in the AIA's *Architects Handbook on Facility Programming*, as well as in Wolf Preiser's books *Facility Programming; Programming the Built Environment, The Professional Practice of Programming;* and *Building Evaluation* (NCARB). He has co-authored seven books for the Bruner Foundation (including *Connections: Creating Urban Excellence; Rebuilding Communities; Building Coalitions for Urban Excellence; Visions of Urban Excellence; Sustaining Urban Excellence;* and *Commitment to Place*).

Dr. Farbstein was instrumental in developing the facility planning component of the National Institute of Corrections' "Planning of New Institutions" (PONI) program. Mr. Farbstein also participated in offering other training programs for NIC, including their "Facility Planning and Plan Review" program. He has served as an expert witness to the Civil Rights Division of the U.S. Justice Department on cases concerning conditions of confinement in Michigan and Florida.

Dr. Farbstein was project director and lead author of the Corrections Planning Handbooks for the California Board of Corrections. This was updated as a book by Mr. Farbstein, Correctional Facility Planning and Design published by Van Nostrand Reinhold.

Dr. Farbstein has developed architectural programs, concept designs, facility and site evaluations and operational studies for numerous correctional and criminal justice facility projects. He developed system-wide detention and criminal justice facility master plans for San Luis Obispo, Placer, Tulare, Kern and Fresno Counties in California as well as Linn, Benton and Lincoln Counties in Oregon and Washoe County (Reno) Nevada. He led the team which developed a master plan for, and programmed, $79 million worth of adult and juvenile correctional facilities for Bexar County (San Antonio), Texas.

Dr. Farbstein has programmed jails for Placer, Butte, San Luis Obispo, Sacramento and Santa Cruz counties and conducted a staffing analysis for the Boulder County, Colorado jail. He completed an assessment of Hillsborough County Florida's main jail and a major jail evaluation and planning project for Sacramento County. He worked on the programming and site master planning of an 1,100 bed maximum security prison for the California Department of Corrections and assisted in developing the program for a 1,700 bed medium security prison in San Diego County. Recently, in response to serious problems in the Los Angeles County jail system, he assisted in planning options to convert multi-occupancy cells and dorms within the Men's Central Jail for single occupancy and to update the facility for a 50-year life.

Dr. Farbstein has developed needs assessment studies and design programs for a very large number of juvenile detention facilities. Some examples of his clients include: the New York State Division for Youth, San Francisco, Santa Clara, Orange, Contra Costa, Ventura, San Luis Obispo, Kern, Los Angeles, Fresno, Nevada, Solano, Sonoma, Stanislaus, and Tulare counties in California as well as for the States of Alaska and Washington, the California Youth Authority and counties in Oregon, Washington, Nevada, and Texas.

Dr. Farbstein received two correctional facility programming and design awards from the American Correctional Association/American Institute of Architects' Committee on Architecture for Justice and three applied research awards for correctional projects from Progressive Architecture magazine (for which he also served twice as juror). He has twice served as a juror for the National Endowment for the Arts.

Dr. Farbstein is a registered architect in California, holds a Bachelors Degree in Fine Arts from UCLA (1965), a Masters Degree in Architecture from Harvard University (1969), and a PhD in Environmental Studies from the Bartlett School of Architecture at the University of London (1975). He is a fellow of the American Institute of Architects and currently serves on the national Committee on Architecture for Justice where he heads its Justice Facility Research Program.

Melissa M. Farling, AIA, LEED AP
*Senior Associate*, Gould Evans | Phoenix, Arizona
*Research Associate*, Academy of Neuroscience for Architecture
melissa.farling@gouldevans.com 602.234.1140

Melissa Farling, AIA is an architect who is actively engaged in the application of neuroscience concepts to architectural settings. She is a Research Associate at the Academy of Neuroscience for Architecture (ANFA) as well as being a Senior Associate at the architectural firm of Gould Evans in Phoenix, Arizona. Her seventeen years of experience have focused on the design and project management of criminal justice facilities and large-scale public projects. Her passion for studying the affects of architecture on behavior began with her Master's thesis, which explored these affects in a highly restricted environment – case study: an Arizona State Prison (1992).

Ms. Farling has been instrumental in the design and/or programming of many criminal justice facilities, including over 3500 beds for adult males and females as well as juvenile detention facilities in Arizona, Nevada, Utah and Montana.

Melissa has additional programming, design and project management experience, which encompasses a breadth of public project types that have further influenced her ongoing research. These include the Biodesign Institute at Arizona State University, Tempe, Arizona; the Clark County Department of Family and Youth Services, Las Vegas, Nevada; and the New Civil and Adolescent Behavioral Health Facility in Phoenix, Arizona. Most recently, she is applying and testing neuroscience principals to programming for Glendale Community College Life Science Building.

Currently, Ms. Farling is assisting the Biodesign Institute at ASU with their post occupancy evaluation. She is also in the process of preparing the report from a post occupancy evaluation for the New Civil and Adolescent Behavioral Health Facility in Phoenix, AZI. This was conducted with the cooperation of the Hospital and the Arizona Department of Administration. The design process and results of the State Hospital's POE has led to several speaking engagements for Melissa including this year's AIA National Convention in Los Angeles. The title of the seminar was "Design That Empowers: Redefining a Behavioral Health Institution".

In her preparation for research specific to prison design and applications of neuroscience, Melissa has attended graduate behavioral neuroscience classes at Arizona State University and continues to observe research conducted in the Center for Neural Interface Design at the Biodesign Institute.

Ms. Farling is a registered architect in Arizona and holds a Bachelors degree in Architecture from the University of North Carolina at Charlotte (1988), and Bachelor of Architecture and Master of Architecture degrees from the University of Arizona (1992). She serves as a local AIA Chapter Past President on the Central Arizona Chapter Foundation Board and sits on the Board of Gnosis Ltd, a non-profit organization which seeks to preserve and present the significant creative contributions of individuals who have changed our world.

Mary S. Galey, AIA
*Projects Administrator,* Federal Bureau of Prisons | Washington, DC
mgaley@bop.gov 202.514.5942

## Education

Masters of Architecture, Tulane University 2005
Bachelor of Architecture, Tulane University 1971

## Professional Registration and Societies

American Institute of Architects (AIA)
National Council of Architectural Registration Boards Certification
Architectural Registration, Maryland License No. 3458
AIA Academy of Architecture for Justice - Standing Committee Chair 2005-2006
American Correctional Association - Facility Design Committee Vice Chair

## Professional Experience

Ms Galey is Projects Administrator with the Federal Bureau of Prisons and has worked her way up Project Architect with over 32 years of Bureau of Prisons service. Throughout this time she has worked almost exclusively on new facilities for the Federal Prison System. Beginning in 1972 with the completion of construction of the Metropolitan Correctional Center in Chicago, Ill to, most recently, the Federal Correctional Institution (FCI) in Berlin, New Hampshire which will be designed to reflect the extreme weather conditions.

She is responsible for the maintenance of the Design Program Guidelines and Concept Drawings for the model correction facility designs used by the Design and Construction Branch in their design-build contracts. She oversees an internal program of post occupancy reviews and recommends adjustments to the design criteria.

Ms Galey has been responsible for over 30 new facilities now operating in the federal prison system. She was integral in the development of new models for the typical facility types and is responsible for the development of a number of unique facilities such as the Federal Transfer Center located at the Oklahoma City will Rodgers Airport, the Administrative Maximum security USP in Florence, Colorado and the first United States Penitentiaries (USP) to be built in the Federal Prison System since USP Marion.

Her work with the bureau has also included technical assistance through the National Institute of Corrections. She has provided design reviews and facility inspections and advice to authorities in Guam and Saipan and most recently worked with architects in Bogota, Republic of Colombia.

Mark Goldman
*Principal,* Mark Goldman & Associates | Atlanta, Georgia
mark@markgoldman.org 404.373.8440

Mark Goldman has been in and out of secure detention and correctional facilities since 1971. He has dedicated the past 26 years to planning justice facilities and non-custody alternatives for juveniles and adults. His building areas of expertise include prisons, jails, and juvenile correctional facilities.

Academically, Goldman earned a B.A. in sociology, a M.S. in urban studies and criminology, a B.S. in architecture, and a M.S. in architecture, with a focus on environment and behavior.

Before studying architecture, he worked in many facets in the justice system -- as a counselor, a grant writer, a resource and program coordinator, a parole evaluator, a probation officer, a work release manager, an intake officer, and as a staff supervisor.

Prior to forming Mark Goldman & Associates in 1999, Goldman was a Planner with Jay Farbstein & Associates, Director of Planning and Programming for a construction/program management firm (Kitchell), and Director of Criminal Justice Facilities Planning and Programming for a large architecture and engineering firm (Rosser).

Goldman currently provides criminal justice consulting services to counties, tribes, and states throughout the country, and to the Department of Justice. Services include: conducting detailed needs assessments and feasibility studies; projecting workload/caseload, staff, and space needs; projecting and profiling inmate populations; evaluating existing buildings and sites; studying and helping implement alternatives to incarceration; developing and analyzing facility development options including renovation, expansion, and new construction; estimating initial and operational costs; assisting jurisdictions in reducing initial and operational costs; developing master plans; developing operational and architectural programs; reviewing and constructively critiquing designs for jails, courts and other justice facilities.

Goldman's publications include:

"Correcting that Correctional Facility Design: The Benefits of Design Review," Co-author with Josh LeFrancois and Dina Getty, *Corrections Today,* June 2004.

*Jail Design Review Handbook,* for National Institute of Corrections, U.S. Department of Justice, 2003.

"Planning for a Captive Audience: Approaches and Problems in Programming Correctional Facilities," Co-author with Dita Peatross, in *Professional Practice in Facility Programming*, edited by W.E.F. Preiser, Van Nostrand Reinhold Publishers, 1992.

"Research to Redesign: Improving California's Prisons," American Institute of Architects/Association of Collegiate Council on Architectural Research, with Craig Zimring and Dennis Dunne, 1987.

"Stamping Out Better Cookies: Case Studies of POE's as part of the Planning through Building Activation Process for a Client that Needs Buildings by the Caseload," Environmental Design Research Association conference, 1986.

*More for Less: Jail Construction Cost Management Handbook,* Project manager and author, California Board of Corrections, 1986.

Scott Hoke
*Retired Administrator*, Northampton County Prison | Easton, Pennsylvania
sahoke@cedarcrest.edu

Scott Hoke began his career in the adult probation and parole profession, where he spent approximately nine years. His first extended exposure to the adult corrections system began when he was employed as an institutional parole officer for Northampton County, Pennsylvania. From that position he was hired to serve as one of the two Deputy Wardens in Northampton County. As Deputy Warden, Mr. Hoke was responsible for oversight of the inmate classification system; the administration of treatment programming; and the booking, receiving, and discharge process. He ended his corrections career as Warden of the same institution and was responsible for managing the expansion and renovation of the original 1871 facility. He has a Master of Public Administration degree from Kutztown University (Pennsylvania) and is currently pursuing a doctorate degree in Criminal Justice from Temple University.

Currently, Mr. Hoke is an Assistant Professor of Criminal Justice at Cedar Crest College in Allentown, Pennsylvania. His research interests include assessing the impact architectural design and administrative management practices have on inmate behavior.

Leslie Johnson
*Administrator*, Curry County Adult Detention Center | Clovis, New Mexico
ljohnson@currycounty.org 505.769.2335

Leslie Johnson has been in corrections for over 20 years. She has been a Detention Facility Administrator for approximately 12 of those years. During that time, Ms. Johnson has worked with all types of supervision including introducing direct supervision into jails that were traditionally linear. Ms. Johnson has developed many alternative programs to reduce jail overcrowding and to provide community services. She has also participated in the development of a therapeutic community within the jail setting. Ms. Johnson is a strong proponent of programming in jails and any other movement that will effect the immediate environment of the offender to a positive and restorative activity.

Jonas Kaplan, PhD
*Assistant Research Psychologist*
Ahmanson-Lovelace Brain Mapping Center UCLA Neuropsychiatric Institute | Los Angeles, California
jonask@ucla.edu 310.794.4964

Jonas Kaplan is an Assistant Research Psychologist at the Ahmanson-Lovelace Brain Mapping Center at UCLA. Dr. Kaplan received his training in cognitive neuroscience in the Department of Psychology at UCLA, where he studied hemispheric specialization in split-brain patients and in healthy populations. His recent work has focused on using functional magnetic resonance imaging (fMRI) to study the cognitive and social aspects of brain function.

Dr. Kaplan has investigated the brain processes that allow us to empathize with and understand other people, and also to distinguish ourselves from others. For example, one line of research aims to understand the neural networks that underlie self recognition, including our ability to recognize our own face and our own voice. Since we often define ourselves in relationship with others, this work has also been concerned with how group membership affects brain function. Recent work published in *Neuropsychologia* showed how political party affiliation can affect the brain's response to political figures.

In addition to his work on self and social identity, Dr. Kaplan has also investigated the neural basis of creative insight and is involved in creating a scientific approach to understanding mindful awareness through the Mindful Awareness Research Center at UCLA. He is also a contributor to the International Consortium for Brain Mapping, a research initiative which aims to build a structural and functional atlas of the human brain.

Dr. Kaplan holds a Bachelor of Science in Psychology as a Natural Science from the University of Michigan, Ann Arbor (1996), a Master of Arts degree in Psychology specializing in Cognitive Neuroscience from UCLA (1997), and a PhD in Psychology specializing in Cognitive Neuroscience from UCLA (2002).

Kris Keller
*Correctional Program Specialist*, National Institute of Corrections | Longmont, Colorado
kdkeller@bop.gov 800.995.6429, ext. 119

Kris Keller has worked as a Correctional Program Specialist at the National Institute of Corrections since 1999. She currently manages assistance in administering the small jail, inmate behavior management, and Indian Country jails. Before joining NIC, Ms. Keller was the Inmate Services Manager for the Larimer County Sheriff's Office in Fort Collins, Colorado. Ms. Keller has over 20 years of correctional experience, with responsibilities including inmate medical services, food services, programs, mental health services, classification, jail transition, accreditation, contract management, and policy and procedure development. Ms. Keller has a Bachelor's degree in Industrial and Labor Relations from Cornell University and a Master's degree in Librarianship and Information Management from the University of Denver.

Colonel David M. Parrish
*Commander*, Hillsborough County Department of Detention Services | Tampa, Florida
dparrish@hcso.tampa.fl.us 813.247.8200

David M. Parrish is the Commander of the Department of Detention Services for the Hillsborough County Sheriff's Office in Tampa, Florida. He is responsible for an accredited 4,190 bed jail system comprised of two major facilities and a work release center.

Colonel Parrish is a graduate of Penn State (B.A.), Sam Houston State University (M.A. in Criminology and Corrections), and the 119th Session of the F.B.I. National Academy. In addition, he received an Honorary Doctorate Degree in Humanities from Central Methodist College in 1999.

He is the Past President of the American Jail Association and chaired the Jail Manager's Certification Commission. A long-time member of the American Correctional Association, he has served on the Delegate Assembly, the Board of Governors, as Treasurer and on numerous committees. In addition, he was the recipient of the E.R. Cass Award in 1997. Most recently, Colonel Parrish was appointed by Attorney General John Ashcroft to serve as a member of the National Institute of Corrections' Advisory Board for a three-year term effective August 1, 2004. The 16 person nonpartisan board provides policy direction and helps set program priorities for the Institute.

Colonel Parrish has been with the Hillsborough County Sheriff's Office for over 30 years. He became a Division Commander in 1978, and has held his current position in charge of the County Jail System since 1981.

Beverly J. Prior, AIA, LEED AP
*Principal,* Beverly Prior Architects | San Francisco, California
*Chair*, Academy of Architecture for Justice Advisory Group
BPrior@bparch.com 415.777.9422

Beverly Prior, AIA, is president of Beverly Prior Architects, an award-winning, 30-person firm in San Francisco, one with a special focus on justice facilities. The firm is consistently named one of the Top 100 Woman-Owned Businesses in the San Francisco Bay Area by the San Francisco Business Times, and Beverly was honored as San Francisco's Small Business Owner of the Year in 2001.

Ms. Prior's unparalleled commitment to proactive project involvement makes Beverly Prior Architects a unique architectural firm, one with a sincere commitment to addressing the concerns of all involved parties. Beverly and Beverly Prior Architects has attained a noteworthy reputation in the creation of civic and justice facilities and other community-based design projects.

Ms. Prior's experience in architecture has focused on public projects, with a specialty in law enforcement projects, adult and juvenile detention, prisons, and courts as well as civic projects. Her experience includes needs assessments and feasibility studies, master planning, programming, security consulting, site evaluations and full architectural services for both new and existing facilities.

In her 25+ years of professional practice, Beverly has planned and designed law enforcement, adult and juvenile detention, prison, and courthouse facilities. Her firm is currently the associate architect for the $135 million design-build Alameda County Juvenile Justice Center with HOK. She has achieved national prominence through public speaking at the American Correctional Association's 2004 Summer Conference and her leadership in the AIA's Academy of Architecture for Justice (AAJ) where she currently is the Advisory Group Chair.

She presented the $100 million San Francisco County Jail No. 3 replacement project (for which she did bridging documents) at the AAJ's 1999 "Doing Justice to Design-Build" conference, and she was a juror in 1999 for the Justice Facilities Review. She then chaired the AAJ's 2000 conference in Los Angeles, "Justice in the New Millennium" also known as "The Earthquake Conference" because of the special bonus on Friday night! At the 2005 AAJ conference, she moderated and presented at a workshop called, "The Greening of Justice" about sustainable design issues for justice facilities.

As the 2004-2005 Justice Facilities Review jury chair, Beverly selected jurors and facilitated the evaluation of projects that address the latest issues and solutions affecting the design of justice facilities. In 2005, Beverly launched the AIA San Francisco's Academy of Architecture for Justice Bay Area Chapter. She is the presumptive 2006 chair of the national Academy of Architecture for Justice's Advisory Group.

## Relevant Experience

### Law Enforcement and Civic

- County of Marin New Public Safety Building Feasibility Study
- County of Tuolumne New Sheriff's Complex Feasibility Study and Needs Assessment, Site Evaluation and Selection, and Master plan

- County of Tuolumne County-Wide Facilities Needs Analysis and Site Master Plan
- City of Benicia New Police Headquarters and Civic Center Improvements
- Placer County New Auburn Justice Center
- City of Newark, Public Office, Public Works, City Manager, Administration, Fire and Police Programming, Needs Assessment and Space Studies
- Alameda County Recorders Office Building Needs Assessment
- Bakersfield Police and Fire Substation Needs Assessment and Design
- City of Half Moon Bay New Police Headquarters Programming and Design
- Alameda County Sheriff's Facility Conceptual Design, Needs Assessment and Program
- City of Modesto New Police Headquarters, Operations Building Remodel Design, Master Plan, and Site Evaluation and Selection
- San Francisco International Airport Police Facilities Program and Concepts
- San Jose Police Department's Pre-Processing Center
- City of San Mateo New Police Department Site Evaluation and Selection

## Courthouse

- County of Los Angeles' Long Beach Area Courthouse Site Feasibility Study
- Humboldt County Courthouse and Administration Building Needs Assessment and Renovation
- Solano County Hall of Justice renovation at Fairfield
- Solano County Hall of Justice renovation and expansion at Vallejo
- Stanislaus County Juvenile Court Programming
- Alameda County Juvenile Court Master Planning, Programming, Site Evaluation, Value Engineering
- Alameda County Juvenile Court Design
- Sacramento County Juvenile Court Reprogramming and Master Plan

## Juvenile Detention

- Sacramento County Juvenile Hall Expansion Security Program, Master Plan and Juvenile Courts programming
- Kings County Juvenile Facility Addition
- Mother Lode Regional Juvenile Facility
- Alameda County Juvenile Hall Renovation and Addition
- Alameda County Juvenile Justice Complex Needs Assessment, Master Plan and Site Feasibility Study
- Alameda County Juvenile Hall Design
- Stanislaus County Juvenile Justice Programming

## Adult Detention

- San Francisco County Jail No. 3 Replacement Project Program and Design Criteria Package
- San Francisco County Jail No. 3 Replacement Project
- Kern County Sheriff Lerdo's Infirmary Expansion
- San Francisco New Sheriff's Facility Addition
- Sequoia Field Detention Center
- Riverside County Jail, Presley Detention Center
- Santa Cruz County Jail Upgrades

### Corrections

- Wasco State Prison Emergency Bed Program
- California Institute for Men Emergency Bed Program
- Wasco and Delano Reception Center Dormitories
- Corcoran II Vocational Education Program Buildings
- Conservation Camps Prototype
- Richard Donovan Correctional Facility

## REGISTRATION

Registered Architect -
California C015343

## EDUCATION

University of California, Los Angeles
Master of Architecture, 1980

San Francisco State University,
Bachelor of Arts Urban Studies, 1977

## PROFESSIONAL

American Institute of Architects, S.F. Chapter:
Director, 1990-1991
Secretary, 1992
Vice-President 2002
President 2003

AIA Academy of Architecture for Justice Knowledge Community:
Member 1991-present
National Advisory Group 2003-2005
Vice Chair of the Advisory Group, 2005
Chair of the Advisory Group, 22006
Conference Chair, 2000
Justice Facilities Review Juror, 2000
Justice Facilities Review Jury Chair, 2004

San Francisco Board of Permit Appeals
Commissioner, Vice President
1988-1992

LEED Accredited Professional, 2004

Allen I. Selverston, PhD
*Research Professor*
Institute for Nonlinear Science, UCSD | La Jolla, California
aselverston@ucsd.edu 858.822.2013

## (i) Professional Preparation:

B.A., University of California, Berkeley, 1962, Physiology
Ph.D. University of Oregon, Eugene, OR, 1967, Neurophysiology
Postdoc, Stanford University, Stanford, CA, 1967-1969, Neurophysiology

## (ii) Appointments:

1997-present Research Professor, Inst. for Nonlinear Science, Univ. of Calif., San Diego, La Jolla, CA
1997-2000 Director, Institute of Neurobiology, University of Puerto Rico
1981-1997 Professor, Dept. of Biology, University of California, San Diego, La Jolla, CA
1975-1981 Assoc. Prof., Dept. of Biology, University of California, San Diego, La Jolla, CA
1969-1974 Asst. Prof., Dept. of Biology, University of California, San Diego, La Jolla, CA
1962-1963 Clinical Laboratory Technician, Children's Hospital, Oakland, CA
1962 Investigator, U.S. Naval Radiation Defense Lab, San Francisco, CA

## Honors

PHS Award for course in biological electron microscopy, U.C. Berkeley, 1964
PHS Summer Scholarship, Friday Harbor Marine Laboratory, U. Washington, 1965
Grass Fellowship in Neurophysiology, Marine Biologist Lab, Woods Hole, MA 1966
PHS Physiology Trainee, Univ. Oregon, 1964-1967
PHS Postdoctoral Fellowship, Stanford Univ., 1967-1969
PHS Career Development Award, 1973-1978
Guggenheim Fellowship, 1975-1976
Humboldt Senior Scientist Award, Max Planck Inst., Seewiesen, Germany, 1982-1983
Rosenblueth Fellowship, University of Mexico, 1991
Royal Society of England Fellow, Cambridge University, 1991-1992
Fulbright Award, Cambridge University, 1991-1992

## Government Service

National Science Foundation, Panel Member, Neurobiology Program, 1975-1978
NIH, ad hoc panel member, Computer and Math Sciences Panel, 1976
NIH, workshop on Computer Assisted Neuroanatomy, co-organizer, sponsored by Division Research Resources
NIH, ad hoc panel member, Physiology Study Section
NIH, Panel member, Neurological Disorders Program, Project Review B Committee, 1986-1988

## (iii) Recent Publications

Elson, R.C., Huerta, R., Abarbanel, H.D.I., Rabinovich, M.I., Selverston, A.I., Dynamic control of irregular bursting in an identified neuron of an oscillatory circuit, *J. Neurophysiol.,* **82**, 115-122 (1999).

Falcke, M., Huerta, R., Rabinovich, M.I., Abarbanel, H.D.I., Selverston, A.I., Modeling observed chaotic oscillations in bursting neurons: the role of calcium dynamics and IP3, *Biol. Cybernetics* **82**,517-527 (2000).

Szucs, A., Varona, P., Volkovskii, A., Abarbanel, H.D.I., Rabinovich, M.I., Selverston, A.I., Interacting biological and electronic neurons generate realistic oscillatory rhythms, *Neuroreport* **11**, 563-569 (2000).
Selverston, A., General principles of rhythmic motor pattern generation derived from invertebrate CPGs, *Prog. Brain Res.,* **123**, 247-257 (1999).

Selverston, A., Elson, R., Rabinovich, M.I., Huerta, R., Abarbanel, H.D.I., Basic principles for generating motor output in the stomatogastric ganglion, *Ann. N.Y. Acad. Sci.,* **860**, 35-50 (1998).

Krenz, W., Nguyen, D., Perez, N., Selverston, A.I., Group I, II and III mGLuR compounds affect rhythm generation in the gastric circuit of the crustacean stomatogastric ganglion, *J. Neurophysiol,,* **83**, 1188-1201 (2000).

Deliagina, T.G., Orlovsky, G.N., Selverston, A.I., Arshavsky, Y.I., Neuronal mechanisms for the control of body orientation in clione II. Modifications in the activity of the postural control system, *J. Neurophysiol,* **83**, 367-373 (2000).

Szucs, A., Pinto, R.D., Rabinovich. M.I., Selverston, A.I., Synaptic modulation of the interspike interval signatures of bursting pyloric neurons, J. Neurophysiology, **89**, 1363-1377 (2003).

Elson, R.C., Selverston, A.I., Abarbanel, H.D.I., Rabinovich, M.I., ìInhibitory synchronization of bursting in biological neurons: Dependence on synaptic time constant ,J. Neurophysiology, **88**, 1166-1176 (2002).

Rabinovich, M.I., Pinto, R.D., Abarbanel, H.D.I., Tumer, E., Stiesberg, G., Huerta, R., Selverston, A.I., Recovery of hidden information through synaptic dynamics, *Network: Computation in Neural Systems*, **13**, 487-501 (2002).

Szucs, A., Abarbanel, H.D., Rabinovich, M.I., Selverston, A.I. Dopamine modulation of spike dynamics in bursting neurons. Eur. J. Neurosci. **21,** 763-772 (2005).

Denker, M., Szucs, A., Pinto, R.D., Abarbanel, H.D., Selverston, A.I. A network of electronic neural oscillators reproduces the dynamics of the periodically forced pyloric pacemaker group. IEEE Trans Biomed Eng. **52,** 792-798 (2005).

Selverston, A.I. A neural infrastructure for rhythmic motor patterns. Cell Mol Neurobiol. **25**, 223-244 (2005).

Lee, Y.J., Lee, J., Kim, J., Ayers, J., Volkovskii, A., Selverston, A., Abarbanel, H., Rabinovich, M. Low power real time electronic neuron VLSI design using subthreshold technique.. 2004 IEEE International Symposium on Circuits and Systems 4, IV-744-7 (2004).

Rabinovich, M.I., Varona, P., Selverston, A.I., Abarbanel, H.D.I., Dynamical Principles in Neuroscience, Rev. Mod. Physics (IN PRESS).

### (iv) Synergistic Activities

Director ñ Institute of Neurobiology, University of Puerto Rico (minority)
Director ñ Specialized Program in Neurosciences, University of Puerto Rico (minority)

### (v) Collaborators & Other Affiliations

### (a) Collaborators

H.D.I. Abarbanel (UCSD), Y.I Arshavsky (UCSD), T.G. Deliagina (Karolinska Institutet, Stockholm), R.C. Elson (Point Loma Nazarene University), M. Falcke (Max Planck Institute), R. Huerta (UCSD), W. Krenz (University of Puerto Rico), G.N. Orlovsky (Karolinska Institutet, Stockholm), R.D. Pinto (UCSD), M.I. Rabinovich (UCSD), A. Szucs (UCSD), G. Stiesberg (Cornell University), E. Tumer (UCSD), P. Varona (UCSD), A. Volkovskii (UCSD)

(b) Graduate and Post Doctoral Advisors:
Graduate Advisor: Graham Hoyle (University of Oregon)
Postgraduate Advisor: Donald Kennedy (Stanford)

(c) Thesis Advisor and Postgraduate-Scholar Supervisor:
Recent Graduate Students: Nivea Perez (University of Puerto Rico), Mary Boyle (Burnham Institute), Thom Cleland (Cornell University), Chris Hempel (Brandeis University)
Postdoctoral: Wulf Dieter Krenz (University of Puerto Rico), Rafi Levi (UCSD), Marina Samoilova (Sechenov Institute, Russia), Attila Szucs (UCSD), Marcello Reyes (UCSD)
Number of graduate students advised: 13
Number of postdoctoral scholars sponsored: 14

Edward C. Spooner, AIA
*Senior Vice President, Justice Director,* HOK, LP | Dallas, Texas
*Co-Chair*, Academy of Architecture for Justice Advisory Group
Ed.Spooner@hok.com 214.720.6000

Mr. Spooner has over 35 years of professional experience. For the past 26 years he has specialized in the planning and design of criminal justice facilities. He has been responsible for the successful planning, design, and project management of numerous courthouses, correctional facilities, law enforcement centers, juvenile facilities and detention facilities, both in this country and abroad. Mr. Spooner is thoroughly familiar with current correctional planning and design standards, as well as the use of sophisticated management and scheduling techniques.

A registered Architect since 1968, Mr. Spooner is a recognized national leader in the Justice planning profession. He chaired the AIA Committee on Architecture for Justice National Conference in 2000. He was Chairman of the AIA's Academy of Architecture for Justice in 2005, and was a Juror for the 2001-2002 "Justice Facility Design Review". He is past president of the New Orleans Chapter of the AIA, and a past Director of the Louisiana Architects Association. Additionally, he chaired the State Fire Marshal's Task Force on Life Safety for Institutions. Mr. Spooner has addressed numerous conferences on criminal justice facility planning, including the Fifth International Conference on Justice Design, the Fourth International Courts Design Conference, the 2003 Infrastructure Security Partnership in Washington, DC, and the 2006 American Corrections Association Congress. He has published articles on justice facility design and has served as a Technical Resource Provider for the U.S. Department of Justice, National Institute of Corrections.

## Education

Louisiana State University, Baton Rouge, Louisiana
Bachelor of Architecture

Instructor – Architectural Design
Parsons School of Design
New York, NY

Visiting Critic
College of Architecture
University of North Carolina Charlotte
Tulane University

## Registrations

Registered Architect: Texas; North Carolina; New York; Louisiana
NCARB
LEED Accredited Professional

## Memberships

American Institute of Architects
Academy of Architecture for Justice, Past Chairman
American Correctional Association
American Jail Association
National Sheriff's Association
American Arbitration Association
Texas Police Chief's Association
United States Green Building Council

Mr. Spooner has directed the planning and design of over 50 justice facilities. His project experience includes the following.

## Jails

Lea County Detention Facility, Lovington, NM
South Texas Detention Complex, Pearsall, TX
Travis County Correctional Complex, Austin, TX
Tarrant County Jail Expansion Study Fort Worth, TX
Howard County Jail, Big Springs, TX
Milam County Jail Study, Cameron, TX
Marion County Jail Expansion, Ocala, FL
New Hanover County Jail and Sheriffs Headquarters, NC
Clayton County Justice Complex, Jonesboro, GA
Niagara County Jail, Lockport, NY
Maricopa County Jail, Phoenix, AZ
Oneida County Jail, Utica, NY
Assumption Parish Jail, Napoleonville, LA
Greenville County Jail, Greenville, SC
Henderson County Detention Center, Hendersonville, NC
Cumberland County Detention Center, NC
Orange County Judicial Master Plan, Chapel Hill, NC
Essex County Justice Center, Newark NJ
System Wide Kitchen Upgrade, Six City Jails, New York, NY
Maricopa County Justice Master Plan, Phoenix, AZ
Lewis and Clark County Law Enforcement Center, New Court and Jail Facility, Helena MT
Mecklenburg County Government Master Plan, NC
Johnston County Justice Center, Smithfield, NC

## Corrections

ASP Florence West Expansion, Florence, AZ
500 Bed Medium Security Prison, Jessup, MD
FCI - Manchester, Manchester, KY
N.C. Correctional Institution for Women Expansion, Raleigh, NC
Federal Detention Center, US Immigration and Naturalization Service, Batavia, NY
Ohio Uniform Corrections Plan, State Master Plan, Ohio Dept. of Corrections, Columbus, OH
Regional Medical Unit, Sing Sing Correctional Facility, Ossining, NY
Folsom Prison, Master Plan and Expansion Program, Folsom, CA
200 Bed Super Maximum Security Facility, Arizona State Prison, Florence, AZ
Wade Correctional Center, 500 Bed Medium Security Facility, Homer, LA

## Courts

Brunswick County Courthouse, NC
Bronx Criminal Courthouse, Bronx, NY
U.S. Courthouse Renovation, Alexandria, LA
Marietta Court and Government Center, OH
Union County Court Master Plan, NC
Collin County Court Master Plan, McKinney, TX

## Law Enforcement

Irving Police Headquarters and Jail Expansion, Irving, TX
Plano Police Headquarters Expansion, Plano, TX
Waco Police Headquarters, Waco, TX
Stillwater Police Headquarters and Municipal Building, Stillwater, TX

## Juvenile

Scott D. Moore Juvenile Facility, Fort Worth, TX
Alexander County Juvenile Detention Center, NC
Johnston County Juvenile Detention Center, Smithfield, NC
Buncomb County Juvenile Detention Center, Ashville, NC
Bergen County Juvenile Facility, Bergen, NJ

Captain Linda Suvoy
*Captain*, Sonoma County Sheriff's Office | Santa Rosa, California
lsuvoy@sonoma-county.org 707.565.2511

Captain Linda Suvoy is a 24-year veteran of the Sonoma County Sheriff's Department. She began her career as a cadet and rose through the ranks to become the first female Captain in the Department. In her current assignment as Operations Captain of the North County Detention Facility, Linda is responsible for managing the daily operations of this facility.

Linda has completed two years of college and holds numerous supervisory and management certificates. During her career, Linda has worked a variety of assignments in both of the Department's Detention Facilities. She was instrumental in developing the first Facility Training Program at the North County Detention Facility in an effort to prepare Officers to work in a direct supervision facility. And as a Sergeant assigned to the Personnel Services Bureau, Linda participated in the development of BPAD (Behavioral Personality Assessment Device), a pre-employment video test used by this Department and several other agencies throughout California.

Julian F. Thayer, PhD
*The Ohio Eminent Scholar Professor in Health Psychology*, The Ohio State University |
Columbus, Ohio
thayer@psy.ohio-state.edu 614.688.3450

## Education:

1981 B.A. Indiana University, Bloomington, IN, Psychology with Honors
1984 M.A. New York University, New York, NY, Experimental Psychology
1986 Ph.D. New York University, New York, NY, Psychophysiology with minor in Quantitative Psychology

## Employment:

2006- The Ohio Eminent Scholar Professor in Health Psychology
2002-2005 Senior Investigator, Section Chief, National Institute on Aging
2000-2002 Investigator, National Institute on Aging
1999- Professor II, University of Bergen, Norway
1998-2000 Special Expert, National Institute on Aging
1998 Visiting Professor of Psychology, University of Bergen, Norway
1993-2000 Associate Professor of Clinical Psychology, University of Missouri-Columbia (MU)
1995 Visiting Professor of Psychology and Pedagogy, Free University of Amsterdam, The Netherlands
1986-1993 Assistant Professor, The Pennsylvania State University.
1984-1986 Instructor, The Pennsylvania State University.
1984-1985 Adjunct Instructor, Department of Psychology, New York University, New York, NY.
1980-1981 Teaching Assistant, Department of Psychology, Indiana University.
1979-1980 Research Assistant, Cognitive Institute, Department of Psychology, Indiana University (with Dr. Frank Restle).

## Professional Activities:

2007 Program Chair, Rocky Mountain Bioengineering Symposium
2006- Associate Editor, BioPsychoSocial Medicine
2003 National Academy of Science, Institute of Medicine, Committee on Metabolic Monitoring
2003-2004 Program Chair, American Psychosomatic Society
2002 Advisory Committee, Handbook of Behavioral Medicine
2002- Editorial Board, Psychosomatic Medicine
2002 Program Chair, Rocky Mountain Bioengineering Symposium
2000-2003 Executive Council, American Psychosomatic Society
1999-2006 Executive Committee, Rocky Mountain Bioengineering Symposium
1995-2000 Adjunct Associate Professor, Department of Physical Medicine and Rehabilitation, MU School of Medicine
1999 Program Chair, Society for Behavioral Medicine Annual Meeting
1998- Board of Directors, Rocky Mountain Bioengineering Symposium
1998-2003 Associate Editor, Psychophysiology
1997-2000 Adjunct Associate Professor, Department of Health Services

Management and Medical Informatics, MU School of Medicine
1996-1999 Research Fellow in Residence, The STUDIO for Creative Inquiry, Carnegie Mellon University, Pittsburgh, PA.
1993-1995 Adjunct Assistant Professor, Penn State University
1993-1998 National Institutes of Health, Behavioral Medicine Study Section
1991 Fulbright Fellow, University of Bergen, Norway.
1991 Program Committee, Society for Psychophysiological Research.
1991-1994 Bylaws Committee, Society for Psychophysiological Research.
1991-1994 Panel Member, Ohio Arts Council.
1991-1992 Consultant, General Motors Research Laboratories, Psychophysiology of the Car Project.
1988-1993 Local Representative, Midwestern Psychological Association.
1987-1991 Panel Member, Pennsylvania Council on the Arts.
1984-1985 Consultant, Personality and Human Psychophysiology Lab, Department of Psychology, Howard University, Washington, D.C. (with Dr. Jules P. Harrell).
1981-1984 National Science Foundation Predoctoral Research Fellow at N.Y.U.
1980-1981 Honors Division Research Fellow, Department of Psychology, Indiana University, Bloomington, Indiana (with Dr. Robert W. Levenson).

## Professional Societies:

Sigma Xi
Omicron Delta Kappa
Midwestern Psychological Association
Western Psychological Association
Society for Psychophysiological Research
British Psychophysiology Society
Phi Mu Alpha
Psychometric Society
American Psychosomatic Society
American Psychological Society
American Psychological Association
American Statistical Association
Society for Behavioral Medicine
Rocky Mountain Bioengineering Symposium
The Institute of Electrical and Electronics Engineers (IEEE)
Engineering in Medicine and Biology Society
American Autonomic Society
Academy of Behavioral Medicine Research

## Honors and Awards:

1980-1981 Indiana University Honors Division Research Grant
1981 Indiana University Graduate School of the College of Arts and Sciences Alumni Association Outstanding Undergraduate Award
1981 Sigma Xi Research Recognition Award
1981-1984 National Science Foundation Predoctoral Fellowship
1981-1982 New York University Research Fellowship
1983 Sigma Xi Grant-in-aid-of-research

1983-1984 New York University Fellowship
1987 Liberal Arts Faculty Development Graduate Assistantship Award
1987 Nominated for the Distinguished Scientific Award for an Early Career Contribution to Psychophysiology, Society for Psychophysiological Research
1988 Invited Lecturer - University of Bergen, Norway
1988-1991 First Independent Research Support and Transition Award, NIMH
1989 Research Initiation Grant, The Pennsylvania State University
1989 Visiting Research Professor, Fondazione Clinica del Lavoro, Gussago, Italy
1991 Fulbright Fellowship - University of Bergen, Norway
1995 EPOS Research Fellow and Visiting Professor, The Free University of Amsterdam, The Netherlands
1996 Research Fellow in Residence, The STUDIO for Creative Inquiry, Carnegie Mellon University
1996 Recipient, Early Career Award for Contributions to Psychosomatic Medicine, American Psychosomatic Society
1996 Alvarez Award in Electrogastrography, International Electrogastrography Society
1996 Wakonse Scholar Award for Excellence in College Teaching
1999 Recipient, Visiting Scholar Award to University of Leiden, the Netherlands, American Psychosomatic Society
1999 Elected to Academy of Behavioral Medicine Research
2000-2003 Elected to the Council of the American Psychosomatic Society
2000 University of Bergen, Faculty of Psychology Publication Award
2003 Elected Fellow, Society for Behavioral Medicine

## Grants:

*Distress and alcohol use in ethnic minorities*, PI.
First Award, NIAAA, Total Direct Costs $190,000.00. July 1, 1988 - June 30, 1991.

*Psychophysiological responses to music*, PI.
Research Initiation Grant, PSU, Direct costs $10,000.00. July 1, 1989 - June 30, 1990.

*Desensitization and cognitive therapy in General Anxiety*, Co-investigator; Thomas D. Borkovec, PI. NIMH, Total Direct Costs $1,112,013.00. July 1,1991 - June 30, 1996.

*Flying Carpet, A Page from the Book of Skies;* Co-PI
Penn Council on the Arts, Direct Costs $4,700.00. July 1, 1990 - June 30, 1991.

*Comparison of two measures of system complexity*, PI.
University of Missouri Summer Research Fellowship. Direct costs $4000.00, June, 1994.

*Comparison of two measures of system complexity*, PI.
University of Missouri Research Council Grant. Direct costs $3000.00, June, 1994.

*Effects of Fitness on Autonomic Control of the Heart*, PI.
University of Missouri Research Board Grant. Direct costs $33,973, June 1, 1995 - May 30, 1996.

*Early interventions to prevent disability among children with juvenile rheumatoid arthritis*. Co-investigator; Kristofer Hagglund, PI. National Institute on Disability and Rehabilitation Research, Direct costs $430,000, 1993-1998.

*Missouri Rehabilitation Research Training Program*, Co-investigator; Susan P. Buckelew, PI. National Institute of Health, Direct costs $889,694, 1994-1999.

*Social inference in American and Chinese perceivers*, Co-PI; Douglas S. Krull, PI. National Institute of Mental Health, Direct costs $94,613, June 1, 1996- May 30, 1998.

*Heart period variability measures as indices of cardiac autonomic activity in the laboratory and in the workplace*, Co-PI; William R., Lovallo, PI. MacArthur Foundation, Direct Costs $68,000, 1996-1998.

*Tracking the human brain*, Co-investigator (25% effort); James McClelland, Carnegie Mellon University, PI. National Science Foundation, Direct costs $2,121,120 , July 1, 1997 - June 30, 1999.

*Functional magnetic resonance imaging (fMRI) for the mapping of brain function*, Co-PI; G. Gratton, PI. UM Research Board, Direct costs $90,000 , 1998.

*Multi-level investigation of Black-White differences in cardiovascular function*, PI., Office of Minority Health Research and National Institute on Aging, Total direct costs $ 150,000.00, 2000-2002.

## Partial Bibliography:


Merritt MM, Bennett GG, Williams RB, Sollers JJ 3rd, Thayer JF: Low educational attainment, John Henryism, and cardiovascular reactivity and recovery to personally-relevant stress. *Psychosomatic Medicine* 2004: 66: 49-55.

Hall M, Vasko R, Buysse D, Ombao H, Chen Q, Cashmere JD, Kupfer D, Thayer JF: Acute stress affects heart rate variability during sleep. *Psychosomatic Medicine* 2004; 66: 56-62.

Neumann SA, Waldstein SR, Sollers JJ 3rd, Thayer JF, Sorkin JD: Hostility and distraction have differential influences on cardiovascular recovery from anger recall in women. *Health Psychology* 2004; 23: 631-640.

Neumann SA, Sollers JJ 3rd, Thayer JF, Waldstein SR: Alexithymia predicts attenuated autonomic reactivity but prolonged recovery to anger recall in young women. *International Journal of Psychophysiology* 2004; 53: 183-195.

Mager DE, Merritt MM, Kasturi J, Witkin LR, Urdiqui-Macdonald M, Sollers JJ3rd, Evans MK, Zonderman AB, Abernethy DR, Thayer JF: Kullback-Leiber clustering of continuous wavelet transform measures of heart rate variability. *Biomedical Sciences Instrumentation* 2004; 40: 337-342.

Hansen AL, Johnsen BH, Eid J, Sollers JJ 3rd, Thayer JF: Hjerteratevariabilitet: En lovende tilnaerming til studiet av psykologiske prosesser. *Tidsskrift for Norsk Psykologforening* 2004; 41: 2-8.

Pallesen S, Johnsen BH, Hansen A, Eid J, Thayer JF, Olsen T, Hugdahl K: Sleep deprivation and hemispheric asymmetry for facial recognition reaction time and accuracy. *Perceptual and Motor Skills* 2004; 98: 1305-1314.

Thayer JF: On the importance of inhibition: Central and peripheral manifestations of nonlinear inhibitory processes in neural systems. *Dose-Response (formerly Nonlinearity in Biology,Toxicology, and Medicine)* 2006; 4: 2-21.

Hansen AL, Johnsen BH, Sollers JJ 3rd, Stenvik K, Thayer JF: Heart rate variability and its relation to prefrontal cognitive function: The effects of training and detraining. *European Journal of Applied Physiology* 2004; 93: 263-272.

Thayer JF, Lane RD: The importance of inhibition in dynamical systems models of emotion and neurobiology. *Behavioral and Brain Sciences* 2005; 28: 218-219.

Waldstein SR, Giggey PP, Thayer JF, Zonderman AB: Nonlinear relations of blood pressure to cognitive function: The Baltimore Longitudinal Study of Aging. *Hypertension,* 2005; 45(3): 374-379.

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Dr. Wener is the Head of the Department of Social Sciences and Associate Professor of Environmental Psychology at the Polytechnic University in Brooklyn, N.Y. He is Past President, Division of Population and Environmental Psychology, American Psychological Association and winner of the 1995 Environmental Design Research Association Award for Extraordinary service to the field of Environmental Design Research.

Prof. Wener's research and consulting have focused on the way correctional architecture affects facility operations and the perceptions and behavior of staff and inmates. This work began in 1975 with evaluations of the then new federal Metropolitan Correctional Centers in Chicago and New York. He has since conducted evaluations of dozens of prisons and jails and several large nationwide surveys of correctional facilities. He has consulted in the area of facility design and planning for adult and juvenile detention and corrections facilities

Prof. Wener currently an investigator for a National Institute of Corrections funded study to examine best policies and practices used by direct supervision jails in dealing with overcrowding. He served as consultant to "Cost and Design Implications for Third Edition Conditions of Confinement Standards." This effort, funded by the National Institute of Justice, resulted in a manual used in implementing changes to the American Correctional Association's Standards for Adult Correctional Institutions. He developed (with Jay Farbstein) a Standardized Environmental Evaluation system for correctional environments for the National Institute of Corrections and the National Institute of Justice.

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Len Witke, AIA, NCARB
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Len Witke, Manager of the Public Architecture Department, has more than 30 years of architectural experience, primarily in institutional and public buildings. His responsibilities include business development and project planning, design, and management. In his most recent position as the Director of Architectural Services at a nationally recognized architectural and engineering firm, his projects included healthcare, facilities, mental health institutions, prisons, juvenile detention facilities, jails, courts, police departments, city and county administrative offices, both strategic and master planning studies.

As the Senior Staff Architect for the State of Wisconsin Department of Corrections, Witke was the designated historic preservation officer. He was responsible for the capital projects budget representing the department before the State Building Commission and managed the design and construction of all major projects for the department. He also represented the department on issues related to code compliance, conditions of confinement, security technologies, and institution master planning.

Upon his retirement from state service Witke started XCEL 4 Associates, Inc. and provided consulting services on many jail projects, large correctional projects, and master planning studies. As chief editor and a contributing author, Witke published "The Planning and Design Guide for Secure Adult and Juvenile Facilities" in December 1999. Witke's "balanced approach" to jail overcrowding is a unique and often well received solution that calls for the implementation of alternatives to incarceration and the construction of needed jail beds, based on jail population characteristics, support by the judicial branch, and community acceptance.

In his current role at Mead & Hunt, Inc., Witke's department provides services for justice, higher education, health care, and municipal clients. The projects range in size, budget, and complexity which makes them challenging and rewarding. Mead & Hunt's long list of repeat clients testify to the fact that client relationships are the firm's and Len's driving force.

## Areas of Expertise

Public facilities planning and design
Architectural programming
Project management
Historic preservation
Needs assessments

## Education

BA, Architectural Design, University of Illinois at Chicago

## Registration

AIA,– Wisconsin, Illinois, Minnesota
NCARB

## Memberships

Member, American Institute of Architects, Director-At-Large, AIA Wisconsin
Member, American Correctional Association and Wisconsin chapter, Member of the Facility Design Committee and vice Chair of the Technology Committee
Member, American Jail Association
Past member, National Institute of Justice, Corrections Committee on Law Enforcement and the Corrections Technology Advisory Council

## Credentials

Professional faculty, University of Wisconsin Extension Seminars for Jail and Prison Planning and Construction, and Special Needs Inmates
Consultant to the Department of the Army, Architectural program development training for the US Disciplinary Barracks Staff at Fort Leavenworth, Kansas
Consultant to the National Institute of Corrections, Developed Seminar for Master Planning of Correctional Facilities

## Presentations

Presenter, American Correctional Association national conferences

## Awards

Wisconsin Department of Health & Social Services, Secretary's Excellence Award, 1989
APEX 2000 Publisher's Award for "Planning and Design Guide for Secure Adult and Juvenile Facilities"

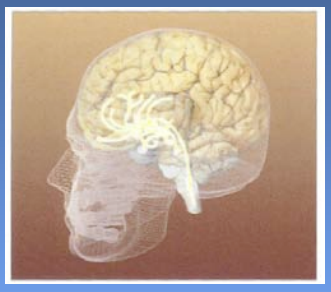
## Past employment

Wisconsin Department of Corrections
Wisconsin Department of Health & Social Services
XCEL 4 Associates, Inc.

**neuroscience and correctional facility design workshop:**
understanding cognitive processes in correctional settings

## Attachment 5: Introductory Presentation - Eberhard - Neuroscience and Correctional Facilities

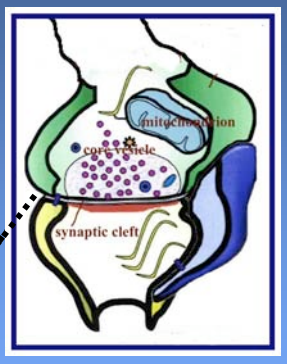
## Neuroscience and Correctional Facilities



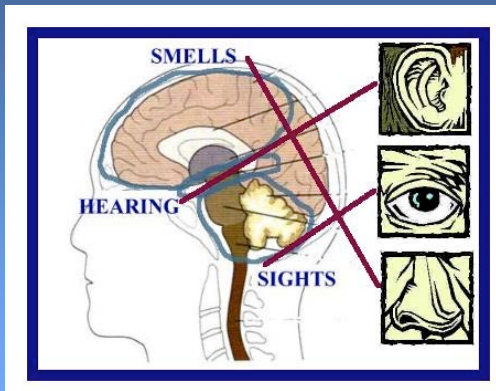
The Brain

Most complex assembly known to us

10 billion neurons and 90 billion glial cells




## Neuroscience and Correctional Facilities




Plus

Touch

Taste

Proprioception

## Neuroscience and Correctional Facilities

**Neuroscience is:**

The study of the brain and the mind. There are four areas of exploration:

1. Genetic studies of the formation and plasticity of the brain
2. Molecular and cellular studies of the brain
3. Cognitive neuroscience studies of behavioral activities of the mind
4. Systems studies of vision, hearing, etc.

## Neuroscience and Correctional Facilities


**•The impact of daylight and views, including level of luminance and means of control**

**•The impact of color on perception.**

**Hypothesis: the retinal area of the visual cortex is influenced by daylight differently than by artificial light providing inmates with a greater sense of well-being**

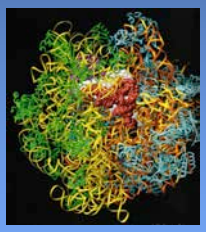
**• The impact of ambient noise on stress and communications**

**Hypotheses: ambient noise in excess of 60 decibels will increase cortical levels and consequently stress**

## Neuroscience and Correctional Facilities

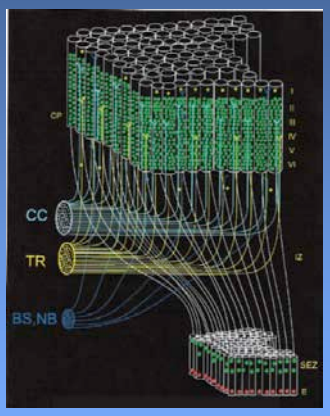
**Proprioception**

DNA



Proteins

## Neuroscience and Correctional Facilities




**Brain Development**

Primary repertoire

Secondary repertoire

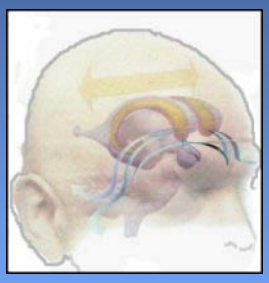
## Neuroscience and Correctional Facilities

**Impact of size and density of space in which one is confined leads to a sense of crowding**

**Proprioception**

**Hypothesis: Inmates raised in North America will have a sense of crowding that is different than inmates from South America, because their secondary repertoires have been formed differently.**

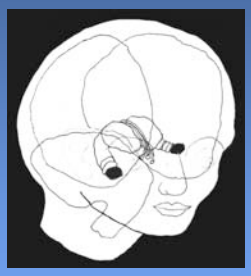
## Neuroscience and Correctional Facilities



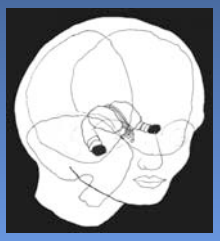
**Thalamus**

**Hippocampus**

**Amygdala**



## Neuroscience and Correctional Facilities



- **The impacts of isolation and solitary confinement on prisoner behavior**

**Hypothesis: When prisoners are deprived of stimulation from their environment or human contacts, there is a strong inclination to hallucinations that trigger the amygdala to induce exaggerated anger.**

## Neuroscience and Correctional Facilities

The scientific process has the following steps:

1. A problem or opportunity is recognized
2. A statement is prepared that describes the problem or opportunity in terms that fit a "paradigm"
3. Testable hypotheses are posed based on step 2

==========

4. Experiments are done to confirm or deny hypotheses
5. Results are published and others attempt to duplicate the results obtained in step 4
6. Results can eventually be incorporated in objective statements and/or design guidelines.

## Neuroscience and Correctional Facilities

In order to create a useable problem statement we need to "bound" the nature of our inquiry

We are not addressing the political or ethical issues

We are not addressing the management issues of prisons except those that are related to architectural settings

We are not addressing the social interaction between prisoners or with guards except those related to architectural settings

We are not addressing special circumstances outside of normal confinement, such as riots, epidemics, floods

## Attachment 6: Introductory Presentation - Wener - Environmental Stressors in Correctional Facilities

# Environmental Stressors in Correctional Settings

**Behavioral, Psychological, Psycho-physiological Responses to the Environment**

**Richard E. Wener,**
**Polytechnic University**

NIC Workshop on Neuroarchitecture

New Orleans, October, 2006

## STRESSORS IN PRISON? TAKE YOUR PICK

- A Partial list includes:

## Crowding

## Isolation

http://www.dcs.qld.gov.au/About_Us/The_Department/Custodial_Corrections/Capricornia_Correctional_Centre/index.shtml

## Noise

http://www.24x7updates.com/FullStory-News-More_Noise_is_equal_to_More_Chances_of_Heart_Attack-ID-200675.htm

## Bad Lighting – lack of daylight

## Lack of Access to Nature

## Several things to note about all of these:

### 1. Everything is worse in a prison or jail

- Involuntary confinement
- Extreme exposure –
  - Close, long term, few options
- Multiple stressors may increase impact of each
  - (e.g., noise builds on crowding)
    (like drug potentiation?)

## 2. We tend to speak of inmates…

…but staff suffer, too

- lowered effectiveness
- lower satisfaction
- burn-out, turnover

Designing a work environment, too

- OSHA standards may be relevant

## 3. These are difficult settings to study.

Information is more limited than we would like.

- Limited access to settings – time consuming
- Informed consent issues
- True experiments (random assignment) almost impossible – Quasi-Experiments difficult
  - But some environmental conditions are randomly distributed
- The most critical settings are the hardest to study (i.e., effects of isolation in supermax)

## Some Effects Have Been More Studied
Much research on **crowding in prisons**

- More forces pushing to increase population than decrease it
- Confluence of interest of psychologists and the courts
  - Paulus, McCain, Cox
    - (can we count on the courts to help anymore?)
- As for most topics – there are dissenters about level of impact
  - Gerry Gaes, ex head of BOP research
- Issue - not whether crowding bad but how, where, at what level
  - Individual stress v institutional stress

## Crowding Issues

- Density v Crowding
- Planned prison density v over rated planned or capacity
  - 2 in single v 2 in double?
  - 70 on unit built for 70 v 70 on unit built for 35?
- Social v spatial density
  - # v size

## Much written and some research on isolation in prisons

- Least access to worst cases (Supermax)
- Does not appear to be like lab stimulus deprivation
  - Social deprivation
  - Research on boredom as stressor
- Dissenter on level of impact – Peter Suedfeld
  - "restricted environmental stimulation therapy"
- Issues of how bad, under what circumstances
- Inmate selection issue especially difficult
  - Prospective research needed

## Relatively Little Research on **Noise in Prisons**

- Acknowledged noisy settings
- Noise is psychological dimension
  "unwanted sound"

  But measurements purely physical
  dBA (v sones?)

- Recent changes proposed to ACA Standards
  Emphasize other aspects – reverberation
  reverberation may relate more to acoustic experience

## Little on lighting, view, color,

Generally not recognized as critical issues

- Seen as “frill”
- Prone to fads?
  - Bake-Miller Pink

## Our Goal…

- So, instead of reviewing all (in a 3 hour lecture!)
  - Will note some similarities and differences in impact of environmental stressors as a group – with a few specific examples
  - Focus on some least addressed areas (both in design & research) that have potential for large effects

## The Most Studied Stressors…

(In but especially outside prisons are...)

- Crowding
- Noise
- Isolation

…and have several things in common in terms of mediating variables and outcomes

## Stress Factors..

Level of exposure **is important**

Exposure to higher levels for longer time is more stressful

- Dorms vs single & double rooms

- How?
  - How long, how high?
  - Dose/response?
  - Linear?
  - Step-function?

## Predictability and control **are key**

- Regular, predictable events are less stressful than random ones
- Controllable situations are less stressful than uncontrollable ones
  - Difference between stressful and unstressful noise may be the presence of a switch, even if not used
    - noise
  - In some cases control defines the stress
    - Self-controlled isolation is privacy
    - Uncontrolled isolation is solitary confinement
- Much research to be done – especially in prisons and especially on long-term impacts
  - Because of nature of predictability & control and because of their importance, they may be particularly sensitive to neuro-science approach
    - Orienting? Attention? Vigilance?

## Stress Impacts

- These kinds of conditions are:
  - **Perceived as stressful - unpleasant** –
    - Self rating
    - Try to escape or avoid them
  - In some cases people **habituate** to them
    - Nervous system reacts more at first than after a while
    - But…even then, when less noticed, ***may still produce measurable physiological stress*** on some indices (such as psychophysiological markers).
      - E.g. – airport noise

## They negatively affect

- Task performance (especially with complex tasks)
- Social behavior – withdrawal
- Motivation/frustration tolerance measures (i.e., proof-reading)
- Psychophysiological indices of stress
  - BP, cortisol, epinephrine (tricky to measure)
- In prison may also affect
  - Spatial behavior
  - Sick calls, incidents,
  - Reduced positive behavior such as use of programs

## Daylight & View Are Different

- Lighting – particularly daylight – and Nature Views are very different from the others
  - not **presence** - but the **lack of something**
  - Not stressors as much as **Moderators of stress**
    **Stress buffers (Wells, Evans)**
  - **Deviation** of the built environment **from a natural state** – we evolved and mostly still live in settings with Daylight & Nature

## &…they are particularly bad in prisons

- **Almost universally bad in providing daylight and nature views**.
  - Where not it is as often by accident as intention
  - Why? Because…
    - Not seen as important issues (‘frills”, trivial, amenities)
    - Not seen as worth the cost
    - May conflict with other goals
      - Windows are holes in secure barrier
      - Nature views can be seen as potential security breeches
        - Ability to communicate with those outside
        - Messy

## Importance

- Growing evidence that daylight & nature may be very **important in health and stress**
  - Light intensity (and spectrum ?) may affect
    - mood, work, concentration, circadian rhythms, sleep (light/dark cycles)
      - Extreme cases: SAD and phototherapy

## Lack of information

- **We know very little about how inmates (and staff) fare who spend long periods…**
  - **…mostly under moderate intensity fluorescents**
  - **… in places without nature or nature views**
    - **Inmates in interior units**
    - **Staff in central control**

## The most interesting new work is on nature access & view

- Biophilia
  - Savannah as site of speciation
- Most research not in prisons. Early study by Ulrich has had huge impact
  - Large part of “evidence-based design” in health care
    - Presence of view of nature vs view of wall in hospital room affected surgical outcomes, such as
      - Length of post-op stay
      - # analgesics needed
- Other studies indicate effect on immune system, pre-operative stress, etc.
- Lack of daylight in emergency rooms related to increased negative effects
  - Post operative delirium

## Other non-prison research

- Increasingly solid evidence that nature view
  - reduces stress,
  - increase recovery from stress,
    - provide immunity from stress
  - increases recovery/restoration from mental fatigue
    - Directed attention fatigue
    - Can affect Irritability, impulse control, reflectiveness
      relevance for corrections
      (Kaplan, Parsons et. al, Hartig & Evans)
- Presence of even small patches of nature reduces level of aggression in public housing
  - Kuo & Sullivan

## Why? How?

- Mechanisms?
  - Directed attention (v easy attention - fascination) as effortful & fatiguing
    - Attention Restoration Theory
  - Nature as inherently stress reducing
    - Biophilia (EO Wilson)
  - Nature as complex, involving, active, living, changing, social attractor
- Nature as moderator or buffer of stress?
  - Low income kids in crowded homes suffer less if access nature (Wells and Evans )

## Two studies on nature in prisons

West found that the presence of nature views reduced illness reports – strongest effect in areas of highest turnover (high stress areas)

Moore – inmates with view of outside had lower blood pressure than inmates with view of internal courtyard

Potential natural studies abound

## State of the Art..

- Many good institutions (pass accreditation) are may very bad on these issues
  - Recent visit to excellent, though crowded jail
    - Good DS operation & staff
    - Inmates spent days, weeks, months largely on living unit (1hour/week outside time)
      - Frosted glass in cell – lower light, no view
      - A few square feet of indirect daylight to dayroom
      - No sight of plants, sky, birds
    - And – this was a good jail!

- Newer wing in same facility had large windows, skylights – great daylight, tough no nature views

## Design Implications

- Great deal of potential for creative designers who can address issues of providing daylight and nature views into an institution without compromising security

## Future of "Neuro-Environmental Psychology?"

- Need to study in depth and with focus to avoid explaining by naming
- May start with why but where, when and how could be more interesting
- Potential to help understand
  - Limiting conditions
  - Interactions
  - Amelirations

## Attachment 7: Small Group Presentation - Noise

# Neuroscience & Architecture

know

## Correctional Facility Design

Scientific knowledge applied to design.

Empirical methods to evaluate intuitive understanding.

Making Connections

team

Beverley Prior
Eve Edelstein
Ed Spooner
David Parrish
Kris Keller

## Premise

***The object is to consider the environment influences brain process that in turn, alter specific outcome measures.***


The interaction between space and noise

space

The distribution of noise in space influences behavior

The interaction between space and noise

space

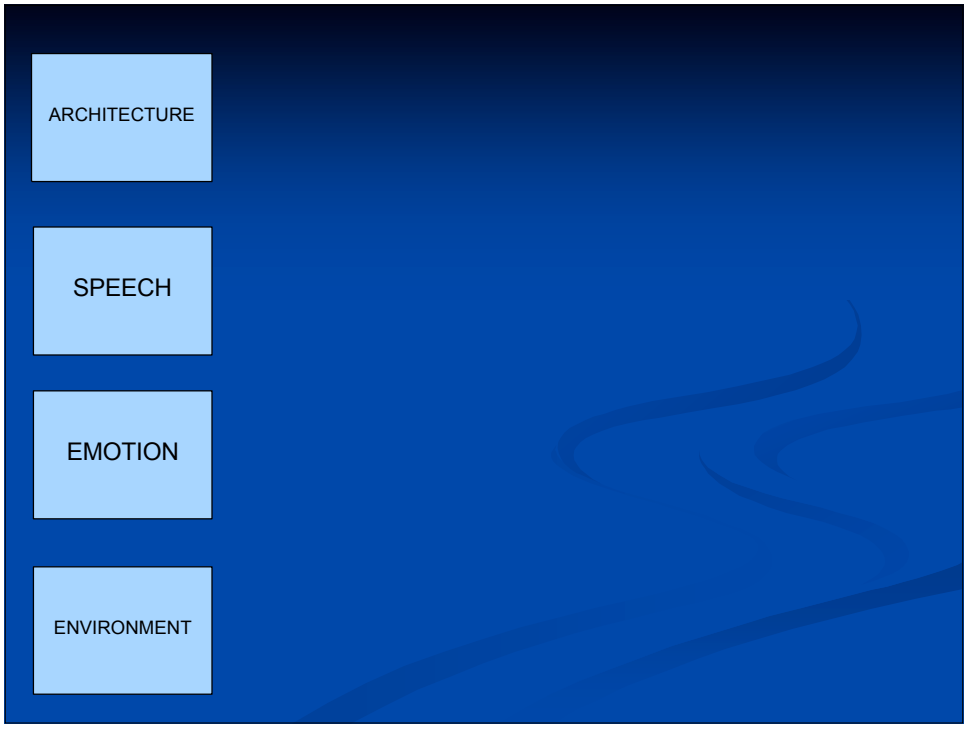
The distribution of noise in space
influences
mirroring behavior

Noise is unwanted sound

premise

The quality and quantity of noise,
i.e. different types of noise,
differentially influence
the response to noise.

Images: Weiner Productions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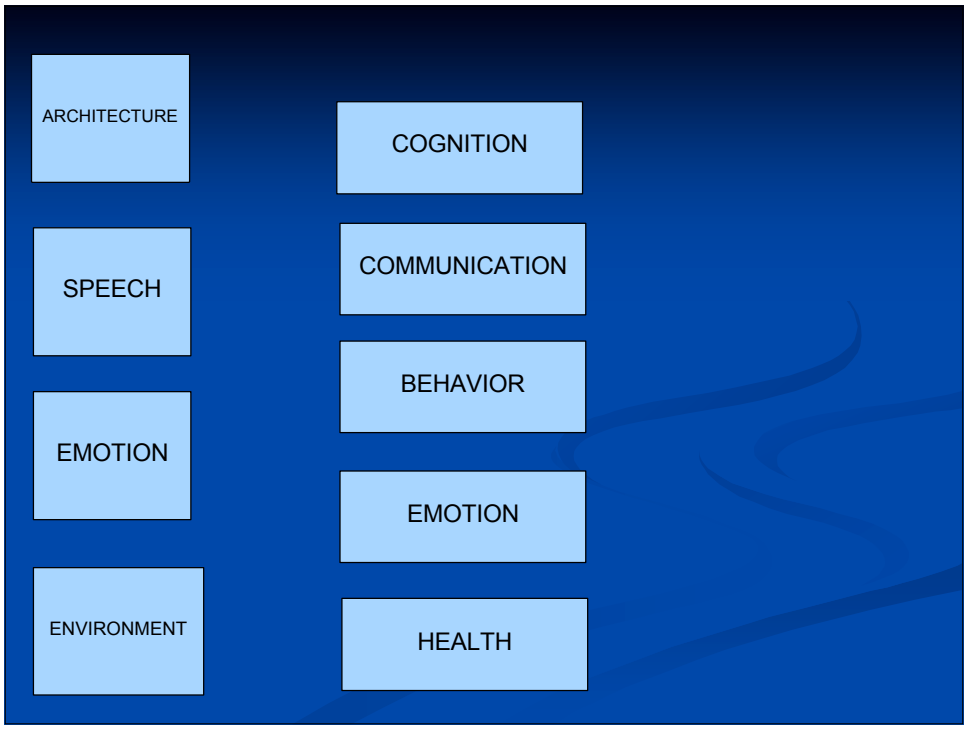
SPEECH
EMOTION
ENVIRONMENT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EMOTION
HEALTH

ARCHITECTURE

SPEECH

EMOTIONAL

ENVIRONMENT

EEG - fMRI

PSI

OBSERVATION

INCIDENTS

STRESS

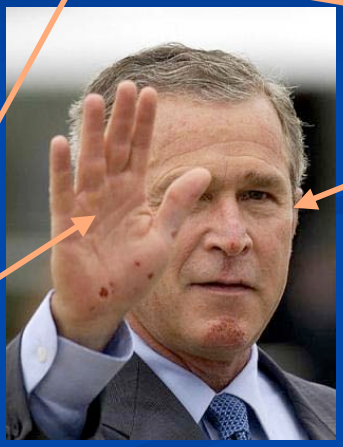
CARDIAC

Mirror behavior:
how far/loud

Performance
Communication

Health outcomes:
stress / disease

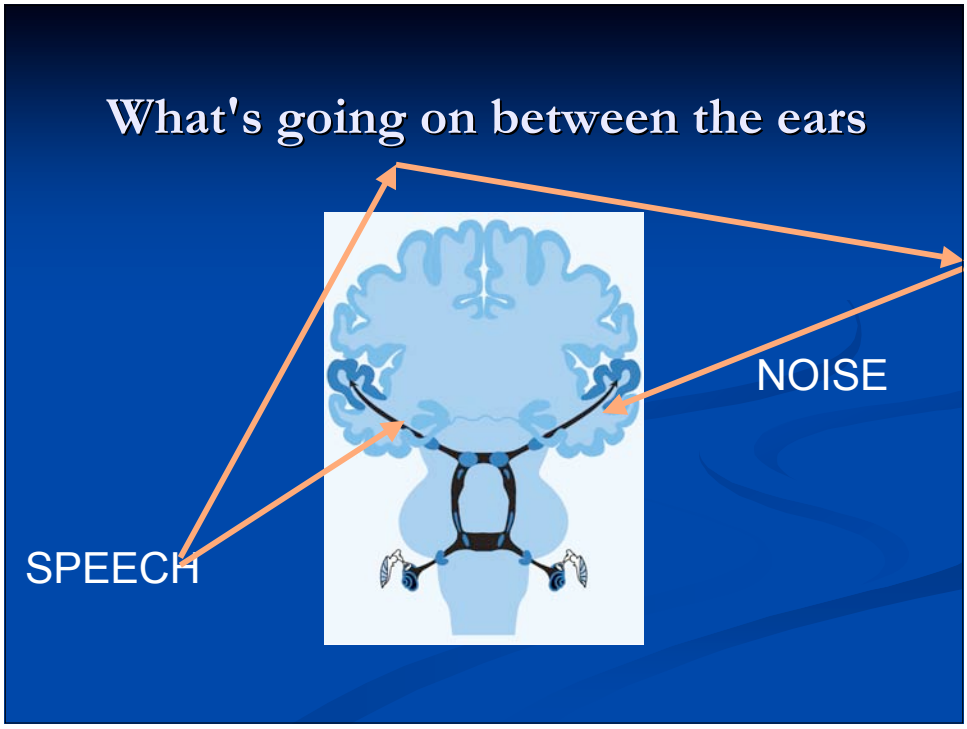
# What's going on between the ears



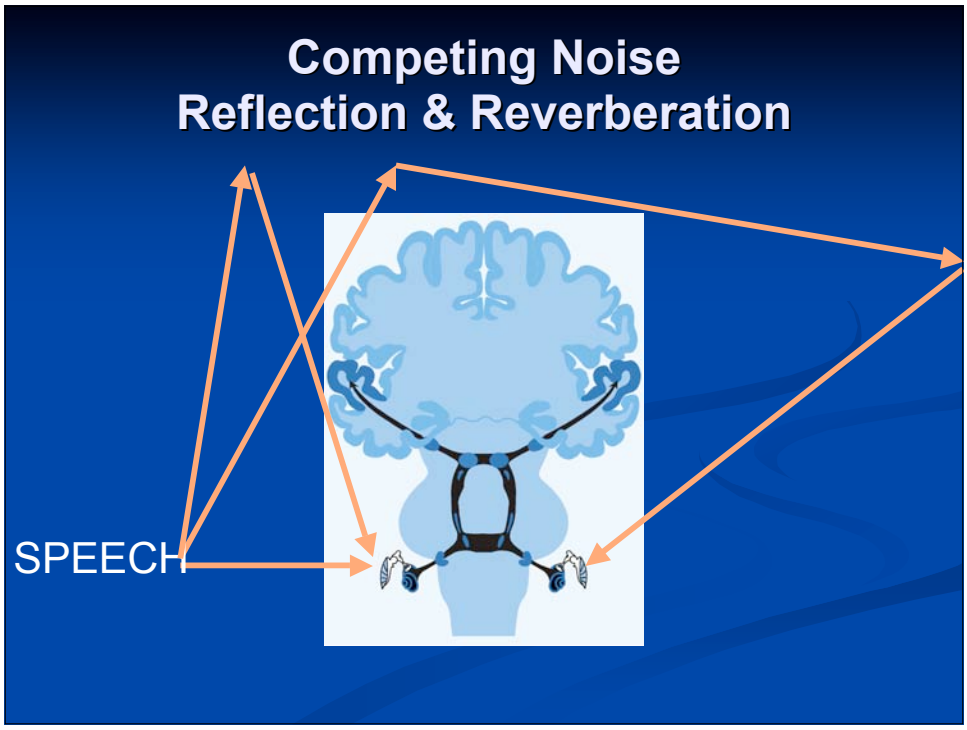
NOISE

SPEECH

## What's going on between the ears




## Competing Noise
## Reflection & Reverberation



## Designing Places for Listening

- Historically, acoustics were a matter of happenstance or a result of reproducing buildings with known characteristics.
- The application of physics to pscyho-physics created the discipline of Acoustics.
  - Wallace C. Sabine
  - Leo L. Beranek
  - Digital revolution

## Reverberation Time

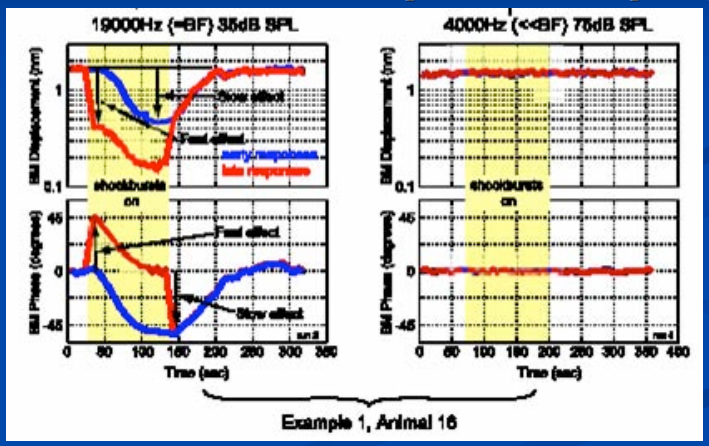
- Influence on:
  - Absorption
  - Distribution of sound
  - Geometry of room
    - Concave surfaces – flutter
    - Parallel - reverberation

## Early reflection time

- Early reflection behavior considered more important by some
  - Clarity best served by quickly reflectant sound of no more than 30 msec after direct sound onset.
    - First 50 msec very important to speech clarity
    - 50-100 msec may or may not be beneficial
    - >100 msec may be harmful to clarity

## Fast and Slow Effects

Time course 1-3 minutes, dependent on frequency




#312 Fast and Slow OlivoCochlear Efferent Effects on Basilar Membrane Motion Involve Different Mechanisms
N.P. Cooper* and J.J. Guinan Jr.*

## Competing Noise

research

TV noise
Booking room
Emotional noise
Mechanical noise
Establish leadership / command role

Control of noise influences outcomes
for both
staff and inmates

control

communication
behavior
stress
performance

Inmate responses can be influenced by managing noise.

Hypo-thesis

Staff responses can be influenced by managing noise.

## Response to noise

research

habituation
attention
potentiation
fatigue
stress

## White noise influences attention

zone

There is an effective dynamic range of noise in
which focus and habituation can operate.

## Broad band noise influences learning & memory.

neuro-arch

**Proposed mechanism for learning and memory erasure in white-noise-driven sleeping cortex.**

Steyn-Ross ML, Steyn-Ross DA, Sleigh JW, Wilson MT, Wilcocks LC.

Phys Rev E Stat Nonlin Soft Matter Phys. 2005 Dec;72(6 Pt 1):061910. Epub 2005 Dec 16.

**A learning rule for place fields in a cortical model: theta phase precession as a network effect.**

Scarpetta S, Marinaro M.

## Noise & Stress

Noise influences staff
recruitment & retention

stress

Noise influences
Inmate behavior & violence

## Noise & Physiological Responses

- Vasoconstriction of the peripheral blood vessels
- Altered breathing rate
- A modification in galvanic skin response
- Skeletal and muscular tension
- Gastrointestinal motility changes
- Blood and urine chemical modifications.

## ACA Standards

research

In the same facility ...

compare responses in
typical versus improved environments.

## Test Battery

- Validate any one experimental result by correlation with multiple other measures.
- Does not require that every study does everything.

## Trans-disciplinary Evidence

- Combine the expertise of several disciplines to validate the findings from each test.
- Utilize rigorous methods in study design and analysis of findings
- Ensures that the results are repeatable, reliable, valid and meaningful.

## Noise informs Form

## Research Method

methods

**cortisol**
**HRV**
**observation**

**Research Priority**

topics

**low cost for materials**
**eg. light > acoustic material**

**operational need**
**staff : inmate**
**scale, size,**

**density : behavior : cortisol : light**

**low cost test instruments**
**HRV, situational awareness / self report**

**relate to design**

# Attachment 8: Small Group Presentation - Inmate-Staff Interaction

## E/B/N Design Research Hypothesis: Inmate-Staff 1.0

Increase of prosocial inmate-staff **contact** reduces **disorder** because of increased activity of mirror neurons. (general population)

| domains of study | *Design* | *Neurosciences* | | *Behavior-Performance* | |
|---|---|---|---|---|---|
| variables in each domain | Barriers:<br>No glass<br>Glass<br>Opaque<br>Introduce officer into space<br>Change in location of officer (i.e. elevated podium) | Neuroscience dimensions<br>Mirror neuron activity | Physiological factors | Higher interaction between inmates and staff | Less disorder |
| measurement techniques targeted to specific disciplines | Traffic patterns, sightlines | TMS, EEG, fMRI (staff) | | Watch videos (staff & inmates),<br>Reaction to facial emotions (photos) | Disorder:<br>Misconduct,<br>Critical incident reports |

## E/B/N Design Research Hypothesis: Inmate-Staff 2.0

Increase of prosocial inmate-staff **contact** reduces staff **turnover** and **absenteesim** because of increased activity of mirror neurons.

| domains of study | *Design* | *Neurosciences* | | *Behavior-Performance* | |
|---|---|---|---|---|---|
| variables in each domain | Barriers:<br>No glass<br>Glass<br>Opaque<br>Introduce officer into space<br>Change in location of officer (i.e. elevated podium) | Neuroscience dimensions<br>Mirror neuron activity | Physiological factors | Higher interaction between inmates and staff | Reduced absenteeism and reduced turnover |
| measurement techniques targeted to specific disciplines | Traffic patterns, sightlines | TMS, EEG, fMRI (staff) | | Watch videos (staff & inmates),<br>Reaction to facial emotions (photos) | Reports |

## E/B/N Design Research Hypothesis: Inmate-Staff 3.0

Increase of prosocial inmate-staff **contact** is modulated by staff-inmate **ratio.**

| domains of study | *Design* | *Neurosciences* | | *Behavior-Performance* | |
|---|---|---|---|---|---|
| variables in each domain | If hypothesis # 1 is true, measure in different sized units:<br>32 person<br>64 person<br>96 person | Neuroscience dimensions<br>Mirror neuron activity | Physiological factors | Higher interaction between inmates and staff | Less disorder |
| measurement techniques targeted to specific disciplines | Traffic patterns, sightlines | TMS, EEG, fMRI (staff) | | Watch videos (staff & inmates), Reaction to facial emotions (photos) | Disorder: Misconduct, Critical incident reports |

## E/B/N Design Research Hypothesis: Inmate-Staff 4.0

Inmates that cannot live in **group settings** have **impaired mirror neurons.**

| domains of study | *Design* | *Neurosciences* | | *Behavior-Performance* | |
|---|---|---|---|---|---|
| variables in each domain | If hypothesis # 1 is true, general population setting, Administrative segregation setting | Neuroscience dimensions<br>Mirror neuron activity | Physiological factors | More and less interaction between inmates and staff | Less disorder |
| measurement techniques targeted to specific disciplines | | TMS, EEG, fMRI (staff)? | | Watch videos (staff & inmates), Reaction to facial emotions (photos) | Disorder: Misconduct, Critical incident reports |

## E/B/N Design Research Hypothesis: Inmate-Staff 5.0

Increase of prosocial inmate-staff **contact** reduces staff **disorder** because of increased activity of mirror neurons. **(gender)**

| domains of study | *Design* | *Neurosciences* | | *Behavior-Performance* | |
|---|---|---|---|---|---|
| variables in each domain | Barriers:<br>No glass<br>Glass<br>Opaque<br>Introduce officer into space (m/f staff, m/f inmates)<br>Change in location of officer (i.e. elevated podium) | Neuroscience dimensions<br>Mirror neuron activity | Physiological factors | Higher interaction between inmates and staff | Less disorder |
| measurement techniques targeted to specific disciplines | Traffic patterns, sightlines | TMS, EEG, fMRI (staff) | | Watch videos (staff & inmates),<br>Reaction to facial emotions (photos) | Disorder:<br>Misconduct,<br>Critical incident reports |

## E/B/N Design Research Hypothesis: Inmate-Staff 6.0

Increase of prosocial inmate-staff **contact** reduces staff **disorder** because of increased activity of mirror neurons. **(race)**

| domains of study | *Design* | *Neurosciences* | | *Behavior-Performance* | |
|---|---|---|---|---|---|
| variables in each domain | Barriers:<br>No glass<br>Glass<br>Opaque<br>Introduce officer into space (race-staff, race-inmates)<br>Change in location of officer (i.e. elevated podium) | Neuroscience dimensions<br>Mirror neuron activity | Physiological factors | Higher interaction between inmates and staff | Less disorder |
| measurement techniques targeted to specific disciplines | Traffic patterns, sightlines | TMS, EEG, fMRI (staff) | | Watch videos (staff & inmates),<br>Reaction to facial emotions (photos) | Disorder:<br>Misconduct,<br>Critical incident reports |

## E/B/N Design Research Hypothesis: Inmate-Staff 7.0

Increase of prosocial inmate-staff **contact** reduces staff **disorder** because of increased activity of mirror neurons. **(mental health)**

| domains of study | *Design* | *Neurosciences* | | *Behavior-Performance* | |
|---|---|---|---|---|---|
| variables in each domain | Barriers:<br>No glass<br>Glass<br>Opaque<br>Introduce officer into space (mental health-inmates)<br>Change in location of officer (i.e. elevated podium) | Neuroscience dimensions<br>Mirror neuron activity | Physiological factors | Higher interaction between inmates and staff | Less disorder |
| measurement techniques targeted to specific disciplines | Traffic patterns, sightlines | TMS, EEG, fMRI (staff) | | Watch videos (staff & inmates),<br>Reaction to facial emotions (photos) | Disorder:<br>Misconduct,<br>Critical incident reports |

## E/B/N Design Research Hypothesis: Inmate-Staff 8.0

Increase of prosocial inmate-staff **contact** reduces staff **disorder** because of increased activity of mirror neurons. **(substance abuse)**

| domains of study | *Design* | *Neurosciences* | | *Behavior-Performance* | |
|---|---|---|---|---|---|
| variables in each domain | Barriers:<br>No glass<br>Glass<br>Opaque<br>Introduce officer into space (substance abuse-inmates)<br>Change in location of officer (i.e. elevated podium) | Neuroscience dimensions<br>Mirror neuron activity | Physiological factors | Higher interaction between inmates and staff | Less disorder |
| measurement techniques targeted to specific disciplines | Traffic patterns, sightlines | TMS, EEG, fMRI (staff) | | Watch videos (staff & inmates),<br>Reaction to facial emotions (photos) | Disorder:<br>Misconduct,<br>Critical incident reports |

## E/B/N Design Research Hypothesis: Inmate-Staff 1.0

Increase of prosocial inmate-staff **contact** reduces staff **disorder** because of increased activity of mirror neurons. (general population)

Independent Variable: contact (general population – male)

1. introduction of officer
2. barrier types
   - glass
   - no glass
   - opaque barrier

Dependent Variable: mirror neuron activity

1. disorder
   - misconduct
   - critical incident reports

## E/B/N Design Research Hypothesis: Inmate-Staff 2.0

Increase of prosocial inmate-staff **contact** reduces staff **turnover** and **absenteeism** because of increased activity of mirror neurons.

Independent Variable: contact

1. introduction of officer
2. barrier types
   - glass
   - no glass
   - opaque barrier

Dependent Variable: mirror neuron activity

1. turnover and absenteeism
   - reports

## E/B/N Design Research Hypothesis: Inmate-Staff 3.0

Increase of prosocial inmate-staff **contact** is modulated by staff-inmate **ratio**.

Independent Variable: contact

1. introduction of officer
2. barrier types
   - glass
   - no glass
   - opaque barrier

Dependent Variable: mirror neuron activity

1. disorder
   - misconduct
   - critical incident reports

## E/B/N Design Research Hypothesis: Inmate-Staff 4.0

Inmates that cannot live in **group settings** have **impaired mirror neurons**.

Independent Variable: (inability to be in a) group setting

1. general population setting
2. administrative segregation

Dependent Variable: mirror neuron activity

1. disorder
   - misconduct
   - critical incident reports

## E/B/N Design Research Hypothesis: Inmate-Staff 5.0

Increase of prosocial inmate-staff **contact** reduces staff **disorder** because of increased activity of mirror neurons. **(gender)**

Independent Variable: contact

1. introduction of officer (male vs. female; male inmates, female inmates)
2. barrier types
   - glass
   - no glass
   - opaque barrier

Dependent Variable: mirror neuron activity

1. disorder
   - misconduct
   - critical incident reports

## E/B/N Design Research Hypothesis: Inmate-Staff 6.0

Increase of prosocial inmate-staff **contact** reduces staff **disorder** because of increased activity of mirror neurons. **(race)**

Independent Variable: contact

1. introduction of officer (race)
2. barrier types
   - glass
   - no glass
   - opaque barrier

Dependent Variable: mirror neuron activity

1. disorder
   - misconduct
   - critical incident reports

## E/B/N Design Research Hypothesis: Inmate-Staff 7.0

Increase of prosocial inmate-staff **contact** reduces staff **disorder** because of increased activity of mirror neurons. **(mental health)**

Independent Variable: contact

1. introduction of officer (mental health)
2. barrier types
   - glass
   - no glass
   - opaque barrier

Dependent Variable: mirror neuron activity

1. disorder
   - misconduct
   - critical incident reports

## E/B/N Design Research Hypothesis: Inmate-Staff 8.0

Increase of prosocial inmate-staff **contact** reduces staff **disorder** because of increased activity of mirror neurons. **(substance abuse)**

Independent Variable: contact

1. introduction of officer (substance abuse)
2. barrier types
   - glass
   - no glass
   - opaque barrier

Dependent Variable: mirror neuron activity

1. disorder
   - misconduct
   - critical incident reports

# Attachment 9: Small Group Presentation - Density, Space, Crowding

# SPACE, CROWDING, DENSITY ISOLATION – SENSORY DEPRIVATION

- We discussed size of space, density and crowding
  - Does size of space in housing area matter?
    - Are smaller units better? Will smaller living units be
      - More inmate focused
      - Easier to insure safety
    - With larger size (staff-inmate ratio)
      - Will Staff be more distant
        - » Ideal span of controlcis affected by classification, design, mission, supervision style

## Designs should keep in mind goals:

- Enhance inmate management within a safe and secure environment
- People should leave in no worse condition then they came
  - Physically
  - Mentally
  - Sociologically (identify self as criminal?)

- Accept that DS works best for most inmates
- DS gives privileges – as part of expectation of normal behavior – lose them if misbehave
- Expectation of compliance with rules

- Institutions should address recidivism
  - Education programs (GED, etc)
  - Substance abuse treatment
  - Anger management
  - Impulse control
  - Criminal thinking

# Hypotheses

Traditionally operators have assumed that having one inmate per cell was optimal. Recently, more facilities have accepted and endorsed multiple housing with 2 through 8 in a room or open dorms seen as acceptable or even desired, making this an issue worth testing

- **Hypothesis 1**
  - **As the number of inmates per cell/bedroom increases inmates will feel less privacy, increased stress, higher levels of aggressive behavior (and increased assaults, vandalism); and (indirectly) staff stress will be greater.**

- Direct supervision depends on officers knowing who inmates are, what are their needs, problems, etc. Bigger units (more inmates) increases the cognitive load on the officer making proper knowledge more difficult. What is the requisite number of inmates that a housing unit officer can expected to manage effectively? One of the most frequently asked questions – & major driver of facility design - is “what is the optimal number of inmates per unit?” (varies with expectations placed on the officer)
  - **Hypothesis 2 – As number of inmates per unit increases officers will have less detailed knowledge of inmate names, faces, issues – be less able to predict and diffuse problems.**

- Inmates are likely to be most anxious in intake – just off the street, possibly intoxicated, surrounded by unknown people and processes. How does the design of the intake-booking area affect these initial responses?
  - **Hypothesis 3**
    - **Design of intake booking (furniture, color, light, space) can reduce fear, shame, stress, anger in inmates, without reducing security and with positive effects for behavior in facility after booking**

- Isolation from people, activities, variety of stimulation can lead to worsening mental health

- **Hypotheses 4 & 5**
  - **Greater degrees of isolation and longer periods of isolation lead to progressive deterioration of mental health, increased anger & aggression toward staff, increased property destruction, increased suicidal behavior.**
  - **Design & technological interventions (light, color, virtual access to settings) can mitigate these problems**