

WORKSHOP

Incorporating Biology and Neuroscience into the Law School Curriculum

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The Gruter Institute Squaw Valley 2004

Law, Behavior and the Brain

Report by Elizabeth Chorvat

Part I

What can lawyers learn from science and what can science tell us with certainty?

This year's conference was opened by **Owen Jones** who presented *Law and Behavioral Biology: from Brain to Behavior and Back*, coauthored with **Tim Goldsmith**. Prof. Jones focused on the deep structure of legal systems in the context of behavioral ecology, a branch of behavioral biology which focuses on species-typical human behaviors that come in different environments. Prof. Jones offered the idea of time-shifted rationality, which describes any trait resulting from adaptive behaviors which is maladaptive for the time. According to Prof. Jones, the issue for the law is how to modify these adaptive behaviors.

Lawrence Parsons of the University of Texas Health-Science Research and Imaging Center presented *What Scientists Can Answer*. Dr. Parsons discussed results from his research in cognitive psychology. Dr. Parsons pointed to structural brain studies which indicate that maturation involves pruning synapses, from which one might infer a model of efficiency for brain matter. The prefrontal cortex, which relates to deductive processes, develops last but is among those areas that we lose first with aging or diseases such as Alzheimer's. See Semendeferi et al, in the *Amer. J. Physical Anthropology* (2001) on maturation, disease states, and the prefrontal cortex. Dr. Parsons discussed our ability to enhance brain function with drugs and neural prostheses and made the point that all of these relate to policy issues, distributional issues, and issues of personhood.

Part I concluded with the Law/Scientist Panel: Questions We Can Answer . The panel included **Hugh Gibbons, Howard Fields, Sara Beale, Owen Jones, Bobbi Low and Pablo Salvador.**

Part II

“Law and . . .” Reports on Current Research

Benito ArruÒada discussed three papers, one related to the utility function in Catholic confession, one related to markets and cognitive biases, and the third related to corporate managers and their educational preparation for dealing with opportunism by subordinates. Regarding Catholic confession, Dr. ArruÒada argued that confession was an adaptive behavior, furthering self-examination and the avoidance of self-deception.

With respect to markets and cognitive biases, Dr. ArruÒada argued that there was a cognitive gap between rulemaking bodies in the 19th century. In England, because judges were barristers and familiar with the market, they were more willing to adopt market solutions. By contrast, in continental Europe, rule-makers were unfamiliar with and distrustful of the market and adopted rules that were less market-oriented.

Claire Hill presented her paper, *Beyond Mistakes: The Next Wave of Behavioral Law and Economics* , in which Prof. Hill questions the characterization of behavioral heuristics as mistakes rather than operative metaphors. For example, describing discriminatory practices in the employment setting, Prof. Hill explained that categories are created by employers in order to economize on information costs. She also discussed the critical attribute of the choice process, which is to say, the focus on alignable differences.

Peter Huang discussed his paper, *Effective Regulations of Affective Investing: Regulating Emotional Investing in Bipolar Securities Markets* . Prof. Huang contrasted the classical view of emotions, which is to say that (i) they disturb rational decision making (the view of Plato, Socrates, and Descartes) with the modern view that (ii) for proper decision-making, we need both emotion and reason (as described by Antonio Damasio). Prof. Huang distinguished emotional states along the investment timeline: anticipatory, interim, and ex post emotional states. Prof. Huang discussed our emotional response to learning, whether institutions foster unemotional investing, and the implications for law if there is emotional investing.

Zack Lynch presented *Neurotechnology and Society: Emerging Neuropolicy Issues*. According to Lynch, the neuroceutical industry can be compared to the computer industry in the 1960s. Current bottlenecks to effective neurotechnology should decrease over time as the cost of analysis lessens and the benefits increase.

Paul Rubin presented his paper, *Why Was the Common Law Efficient*, discussing the scholarship of Hayek and the idea of the common law as more efficient than code law which comes from the top down and offers less accountability. LaPorta, Schleiffer and Vishney have found that, holding other things constant, common law countries have achieved greater development.

J.B. Ruhl presented a summary of his last ten years of research on *Complex Adaptive Systems*. Prof. Ruhl models individual behavior, group behavior, and social system behavior, in order to build a prescriptive model for the law and, in turn, the effect of the law on these models. Ruhl addressed several of the schools represented at the conference: law and microeconomics, law and behavioral psychology, law and biology, and law and complex systems.

Part III

Fairness and Exchange

Kevin McCabe discussed fairness as a balance of expectations. According to Dr. McCabe, when expectations are balanced, individuals follow behavioral norms. When expectations are out of balance, adaptive mechanisms, internally and externally, attempt to bring those expectations back to balance. Fairness amounting to mutual expectations differs from the idea of strategic signaling to achieve gains to trade. Simon Baron-Cohen takes the view that shared attention is critical to the formulation of theory of mind – the ability of humans to read the intention of others based on the situation. Shared attention allows for the creation of mutual expectations about a proposition and the formation of a common set of perceptions about one another's intentions. Triadic expectations – one party's idea regarding another party's idea of the first party - allow parties to share expectations, allowing moves to become informative. Dr. McCabe's latest paper compared a Voluntary Trust Game with an Involuntary Trust Game, where player two knows player one's opportunity costs. His results indicate that knowledge of opportunity costs facilitates reciprocation. See McCabe, Houser, Ryan, Smith and Trouard, *A Functional Imaging*

Study of Cooperation in Two-Person Reciprocal Games (2001).

Carl Simon of the University of Michigan was kind enough to make an impromptu presentation on systems modeling. Dr. Simon discussed complex systems models with the hallmarks of (i) diversity (heterogeneity); (ii) nonlinear dynamics (as contrasted with the strong assumption of linear models); (iii) nonrandom mixing (networks and coalitions); (iv) feedback, learning, and evolution (as contrasted with simple models which do not incorporate learning); and (v) emergence (which is to say, properties found in systems which would have been difficult if not impossible given current technology to predict ahead of time but which nonetheless emerge empirically).

Part IV

Behavioral Biology

Bobbi Low presented her paper, Demographic Transitions and Women's Lives . According to life history theory, very early first reproduction stunts future reproduction, and very late reproduction leads to fewer offspring. In the last 30 years, with the advent of contraception, women's fertility has been changing, increasing in later years (40-49) and decreasing in younger years.

Angelika-Stellzig Eienhauer presented her paper, Perceptions and Cues of Attractiveness . Dr. Eienhauer discussed the nature of beauty and judgments as to mate choice which persist cross-culturally.

Dr. Lionel Tiger presented his paper on culture biology, The Globalization of Success and Failure . Dr. Tiger sought to discuss the ramifications of religious belief and cognitive function and contrasted his views with those of Richard Dawkins, author of The Selfish Gene .

Sara Beale presented her paper on Primate Economics , describing her studies of kin-based cooperation in biological markets where trade buys tolerance (for example, grooming in exchange for food or play with infants). Dr. Beale described market experiments related to grooming and food sharing, sorted by rank and gender, individual preferences, and satiation.

Observational studies do not reveal causation or cognitive bases of behavior. For this reason, Dr.

Beale undertook experiments to isolate variables and reveal underlying causation. She tested for value perception among capuchin monkeys, substituting tokens for favorite foods. Both capuchins and chimpanzees can learn to associate rewards with inherently non-valuable tokens through social situations (watching their partners).

In a second series of experiments, the capuchins were presented with grapes, apples, and chow. The capuchins held onto the low-value items to trade later for more high-value food. They were also given an apparatus for dipping honey, and were able to barter for the tool as well, preferring the tool to the apple, but not to the grape. When tokens were substituted for food, the capuchins and the chimps returned the high-value tokens (a mistake), showing a lack of capacity for matching behavior. The males did not return the high-value tokens, but the females did. A suggested explanation is that primates are not able to inhibit the instinct to reach for the high-value item (the “prepotent” response). They are able to switch when tokens represent food, however. Presumably, the results would be different for humans. Given their nonrandom response, this could be the basis for economic behavior.

With respect to gender differences, female capuchins are always more reciprocal in food sharing and grooming. The females live in the same groups for 30-35 years, so they may have a social system that encourages reciprocity, while there is only one male in the group, all the children are his, and he has no rivals. She concludes that you have to take the social situation into account. capuchins and chimps are intensely cooperative.

In the taxonomy of inequity aversion, disadvantageous inequity aversion is under-compensation, while advantageous inequity aversion is overcompensation. Studies of humans indicate that humans are very quick (within 30 minutes) to develop reasons why they deserve more. Dr. Beale found no evidence of advantageous inequity aversion in capuchins. Dr. Beale tested substituting grapes for cucumbers. Dr. Beale defines envy as wanting something because someone else has it and greed as wanting something because it is there. Token non-exchanges included throwing the token out of the test chamber. When the capuchin partner got a grape, non-exchange jumped to 45%. With no partner, the basic inequity results were only 5%. Where there is a grape present, but no partner is present, non-exchange decreases over time. The ladies got much more upset when another got the grape however. The chimps paid no attention to effort, but the capuchins did. Dr. Beale interprets the results as more envy than pure greed. Comparing different groups with more or less social history, the long-term group (where they grew up together and were born into the group) cared much more about the value of the relationships and refused less,

maintaining communal values over self interest.

In conclusion, non-human primates can assign value to objects, show basic barter skills, and show strong reactions to inequity. Moreover, non-human primates react to equity situations and, like humans, will change their response based on their partner's behavior. The sum of Dr. Beale's observational and experimental work implies economic systems among primates.

Part V

Law, Behavior, and Evolution

Barnaby Marsh presented his paper, Hope, Fear, Consistency, and Projection. Dr. Marsh is an evolutionary biologist, an economist, and a sociologist. He discussed irregularities we might account for in cognitive behavior. Dr. Marsh describes the world as everything we could know, and the mind as a set of adaptive mechanisms. The mind apprehends information from the world, undertaking recognition, categorization and anticipation. In the cognitive domain, we can assume that, as cues come from the environment, they are mapped to internal representations in the brain. Cues from the environment map to representations, which triggers activation in the brain. There are anomalies in this mapping behavior that have been recognized in the process of categorization, as illustrated by the following test.

Which does not belong?

a) Church, temple, prayer, skyscraper b) Church, skyscraper, temple, prayer

We use relatively few cues from the environment to bring to mind knowledge and internal representations. The system works on the principle of best fit, depending on which representations are already active. As a result, the ordering of perceived information can play an important role in how a situation is understood. Because there are potentially many associations for any stimulus, the mind automatically tends to group according to biases, examples of which are anchoring, confirmation bias, framing effects, illusory correlation, sunk-cost effects, and belief polarization. According to Dr. Marsh, both animals and humans exhibit these biases.

Depending on the specifics of the situation, either hope or fear can impact the result. Selective attention can lead to different interpretations of reality. Individuals with different goals and

preferences may reach different conclusions. Cognitive frames affect which outcomes are judged to be “reasonable” relative to other contextual markers. Cognitive processes can be manipulated (guilt through association, repetition, or focus on unrelated issues to make a certain choice seem more or less likely or justifiable). For example, “scenario” tactics are often used in prompting confessions.

Morris Hoffman and **Paul Rubin** presented the empirical findings from their paper, *An Econometric Evaluation of Attorney Effectiveness: Public Defenders versus Private Attorneys* . Hoffman and Rubin found that private attorneys were successful more often than public defenders. Public defenders were less likely to raise issues of fact, which are more expensive to assert and thus file more motions than private attorneys. Of course, public defenders may self-select for weak cases. Dean Grady pointed out that, because the data cannot indicate whether their clients are innocent or guilty, you cannot really sort out successful representation. Dr. Rubin responded that the truly innocent would find it more worthwhile to hire a private attorney. Those who can afford to hire a private attorney do so, according to Dean Grady, so they must perceive that the private attorney will do a better job, but we cannot tell if the success of the case is attributed to a successful attorney or the facts.

Part VI

Neuroscience

Mark Turner presented his paper, *Cognitive Neuroscience and Choice* . Dr. Turner is Dean of the College of Arts and Sciences at Case Western, where he has just established a Department of Cognitive Sciences. Human beings are good at developing stories, parsing sensory perception into objects and events. Some objects we categorize as agents. See *Semantic Leaps* , by Seana Coulson at UCSD, describing narrative leaps in which we engage to make sense of stories. Individuals are able to think about two stories at the same time, which is an evolutionary puzzle, according to Arthur Glenberg when the tasks under consideration are unrelated. Dr. Glenberg would hypothesize that we trigger memory to avoid or inhibit delusion, such that memory works to support the situation in which we find ourselves. Terry Deacon, author of *The Symbolic Species* discusses the difficulty with prepotency (going after one thing while doing another), suggesting that framing in terms of similarity allows for the blending of two stories. As

Kahneman and others have discussed, the idea of playing out scenarios is a powerful driver. In terms of classical economics, agents with beliefs and desires engage in quality choice behavior, effectively running a simulation to put together two different stories. The result will be that a given node will come off of the equilibrium path, such that certain paths become available and not others. It is the contemplation of one story which renders another path counter-factual. According to Kahneman, the persuasive appeal of scenario play is that such an exercise recruits one's evolutionary ability. Taking classical economics as a subset of the science of story or narrative theory, we should investigate the cognitive processes involved. Dr. Turner has written two books on this topic, *Cognitive Dimensions of Social Science* and *The Way we Think*. In cognitive science, whether regarding language, vision, et cetera, the canonical expectation is that the processes are very complex. However, the evidence appears to support the notion that these processes are simple. The neurocognitive study of story or blending is called "backward invention of story," which is not like backward induction but is rather starting where you want to be. In this behavior, the actor goes through a series of situations in order to arrive at a plan to reach his goal. The study of cognitive methods is a subcategory of story theory, of agents engaged in independent decision-making, which would be well-combined with game theory. We are only at the embryonic stage of the study of neurocognitive science, according to Dr. Turner.

Howard Fields presented his work *How Do Drugs and Sensory Cues Interact to Influence Decisions*. Dr. Fields described choice as the conscious assessment of benefits and costs, the conscious feeling of will, the experience of action, et cetera. Dr. Fields discussed the legal ramifications of choice behavior related to alcoholism and the causality of action. His is a biological view, as contrasted with a moral or ethical view which assumes volition and choice. From a biological viewpoint, anti-social choice behavior related to alcoholism and drug addiction begs treatment for the underlying cause rather than punishment.

Are individuals responsible for their actions? One might argue that responsibility implies control. According to Dr. Fields, studies suggest that people operate like automata, that is to say, that unconscious brain activity precedes action and awareness and will. (See Wegner, *The Illusion of Will*). The science of choice would say that biological determinants create drive states (such as hunger), sensory cues (or stimulus) drive choice behavior, and that individuals perform a cost/benefit computation to rank the value of alternate behaviors.

Dr. Fields discussed the implantation of electrodes in the hypothalamus of rats. The hypothalamus plays a role in various behaviors, including eating behaviors. We know now that there is a

pathway from the mid-brain which contains dopamine fibers that make up the human dopamine pathway to a significant portion of the medial cortex. Dr. Fields discussed his experiments in the deactivation of the dopamine pathway by means of either physical path interference or the administration of a dopamine antagonist.

Dr. Fields suggested that similar circuitry is activated in humans. He would argue that dopamine is responsible for certain behavior. For additional material on Dr. Field's thesis, see also Brian Knutson et al., *J. Neurosci.* (2001) (human nucleus accumbens activity correlates with reward predictive cues and happiness); Anton et al., *Psychopharmacology* (2004) (demonstrating that endogenous opioids contribute to ethanol consumption and lending credence to the idea that alcohol has a genetic basis); and D.W. Oslin et al. *Neuropsychopharmacology* (2003) (finding the Naltrexone response – an allele which apparently supports moderation in the use of certain addictive substances – to be genetically determined).

Regarding the neuroscience of will power, there are certain brain circuits that are involved in the computation of delayed reward. Cardinal et al., *Science* 292: 2499-2501 (2001) found that NAc lesions produce “impulsive choice,” which is to say, individuals are unable to defer consumption to increase their reward. Will power is the ability to inhibit immediate small rewards. Dr. Fields posed the question that, if genetics and environment determine choice, how does this affect the construct of responsibility? Does punishment make sense? When should criminal acts be considered diseases? Can we use neural methods to measure the irresistibility of urges? What is diminished capacity? Dr. Fields suggested that one might argue that all crime represents diminished capacity and that the sense that someone is actually making a decision is epiphenomenal.

Elizabeth Phelps of NYU presented *The Human Amygdala and Awareness – The Interaction of Emotion and Cognition*. According to Dr. Phelps, by studying the fear response, we can better understand psychological disorders. Joseph LeDoux and others have studied rat behavior, creating fear responses of increased heart rates, sweating, et cetera, together with activation of the amygdala. Patients with amygdala damage (a common result of epilepsy surgery) do not respond to the same stimuli. As with other mammals, the amygdala is necessary for human physical expression of a learned aversive response in fear conditioning. However, with fear conditioning, there is dissociation between the implicit, physical response to an emotional event and cognitive awareness. Dr. Phelps compared instructed fear with native fear, finding a skin conductive response to both and concluding that individuals can develop the fear response either

through direct experience or symbolic communication. Sin & Davis (2000) suggest that this response may be related to the pain response. Methods of fear learning include fear conditioning, which generates a fear response even when presented subliminally, instructed fear, or observed fear.

How is it that emotions and the amygdala influence awareness? Zajonc (1984) suggested that emotional events are processed more automatically than non-emotional events. Describing her study of attentional blinks in healthy patients and those with amygdala damage, Dr. Phelps concluded that the amygdala modulates perceptual encoding. According to Dr. Phelps, we have an understanding of the amygdala's function to modulate the fear response, and to modulate the awareness we have of our perception of the environment. In summary, the emotional and cognitive systems interact. Emotion influences cognition, cognition influences emotion, and the behaviors should be addressed together.

Part VII

Developments in Neuroscience

Dr. **Lawrence Parsons** discussed his paper, *New Findings on the Brain Evolution, Nature, and Learning in Music*. From Neanderthal artifacts from as much as 50,000 years ago, we know that man's understanding of music has evolved over time. Moreover, from the evidence that remains, there appear to be connections between animal song and human music, specifically connections have been identified between bird song, whale song, and human music. Anthony Wright et al., *J. of Experimental Psychology: General* (2000) demonstrated a relationship between the octave generalization of rhesus monkeys who, unlike humans, do not sing, and human octave generalization in the human tonal system.

Humans have used music to create an adaptive advantage for various tasks, including generating emotions and group cohesion (battle, hunt, sport), social bonding (lullabies), coalition signaling, and training for future tasks. Singing is not an ancestral trait of the hominoid species but a unique feature of humans. Voice was probably the first musical instrument in human evolution, and Dr. Parsons believes that harmony probably arose from unsynchronized group call and response singing.

Dr. Parsons conducted PET studies of human singing (with amateur musicians listening and simultaneously singing in response). These studies revealed distinct areas in the brain – neural system activation – for dissonant as well as harmonious music, with additional areas stimulated when the subjects sang in melodious pitch.

Dr. Parsons also studied the perception of melody, harmony, and sentence meaning in order to ascertain the cognitive function involved in listening to music, identifying different areas of neural activation when subjects were asked to discriminate between subtle changes in melodic and harmonic structure. The subjects were asked to distinguish between subtle changes in the meaning of musical sentences, which appeared to invoke distinct neural activation as well. See also Isabel Peretz (2000) *Biological Foundations of Music* (2000).

With respect to heterogeneity in humans for musical ability, studies by Jenny Saffran of the University of Wisconsin have demonstrated that all human infants are all born with perfect or absolute pitch, but eventually most lose this skill and only relative pitch remains. Dr. Saffran hypothesizes that the additional skills involved in perfect pitch are largely unnecessary and discarded. Interestingly, it appears that English pitch discrimination even appears to involve different neural areas of activation than do areas involving Mandarin pitch.

Michael McGuire presented his paper, *Brain Quirks and Courtroom Testimony*. Dr. McGuire discussed the application of neuroscience to the courtroom. To begin, Prof. McGuire explained that the areas of the brain involved in storing memories and reconstituting memories are not the same. This is illustrated by the fact that memories that are reconstituted can be different from those memories as originally stored, especially those which are unpleasant.

Our visual memory systems can usually remember visual images for only a few hours at a time. Normal individuals can store from 1.5 to 5 objects in visual memory. What are the applications for the courtroom? It is possible to test individuals for this ability, the results of which could provide information as to the reliability of the witness. Concentration on the passage of time can create the impression that time moves slowly. The reverse is also true, and different parts of the brain are activated with respect to each. This should be taken into account on event interpretation, so that testimony may be incorrect in terms of the witness' characterization of the passage of time.

Further, our personal histories may impact our interpretation of what we see. Different

testimonies by two different witnesses to the same event may merely be attributable to their respective personal histories.

Extroverts process information differently than introverted individuals, and will provide different information about the event. Individuals also show different left and right amygdala activation in response to happy or fearful faces. There are also differences in amygdala activation depending on whether an expressive (with an angry or fearful face) individual is facing the witness or looking away. The lesson here for the witness stand is that the physical position of observed individuals may affect the witness' interpretation of what he or she sees. Dr. Phelps added that, with respect to so-called “flashbulb memory,” there is a disconnect between the actual accuracy of the memory and the perception of the witness with regard to the accuracy of his or her memory.

Dr. Karen Parker of the Stanford University Dept. of Psychiatry and Behavioral Sciences presented her paper, *The Effects of Moderate Early Life Stress on Primate Socioemotional Behavior, Cognition, and the HPA Axis*. Most studies of anxiety disorders have historically assumed that stressful triggers precipitate later stress-induced psychological disorders, such that stress has been assumed to be pathological. In the last decade, however, research has been focused on why other individuals exposed to stress do not develop disorders. Things such as positive self-esteem, social competence, and a social support system appear to have protected some individuals from developing psychiatric illness. Dr. Parker focuses on stress that can be positive, in the same sense that Jonas Salk's discovery that exposure to some forms of disease can assist in immunization to disease. Dr. Parker believes that the effects of stress may be dose-dependent, and that low levels of stress may actually be beneficial.

Dr. Parker has created a primate model of stress inoculation, studying squirrel monkeys that were removed from their natal groups and framing a hypothesis that exposing these monkeys to stressors helped them to deal with stress in later life. Dr. Parker tested measures of anxiety and neuroendocrine responsivity, such as dorsal clinging, certain patterns of food consumption, and no-play behavior. Dr. Parker was able to demonstrate differences in responses to stressors, and interprets her data that moderate post-natal stress strengthens socioemotional and neuroendocrine resistance to subsequent stressors. Moreover, when these monkeys were stressed at a later time, they continued to exhibit diminished anxiety compared to the monkeys that were not exposed to post-natal stressors. These monkeys also exhibited increased socioemotional, neuroendocrine, and cognitive control, even up to eight years of age. The implications from these studies are that

moderate early stress may protect against the acquisition of a diverse set of characteristics (anxiety, stress sensitization, et cetera) later in life. Dr. Parker made the point that these findings are specific to this particular type of monkey, and may not be replicated in other species of monkey, to say nothing of replication in humans.

Dr. Kristin Prehn presented her paper on *The Effects of Emotion on the Execution of Normative Judgement Tasks* . Dr. Prehn is working on this project with Dr. Oliver Goodenough. Our behavior in society is guided by norms and values, and normative judgment is the evaluation of actions with respect to these norms and values. Lawrence Kohlberg (1969) believed that moral reasoning is related to cognitive ability. Damasio et al., *Science* (1994) demonstrated that a defect in emotion can play an important role in impaired decision-making. The prefrontal cortex and the amygdala, Damasio believed, are essential to the decision making process. Greene et al., *Science* (2001) posed a thought experiment as to whether one would push a large man onto a track whose body would stop a train filled with many who would otherwise be killed, and found that emotional engagement influences moral judgment. For example, in Greene's hypothetical, a longer response time was needed to formulate the decision to push onto the tracks a man with whom one stood face-to-face. In mapping moral judgments Greene concluded that the medial prefrontal cortex, the posterior cingulate cortex, and the superior temporal sulcus are activated during the contemplation of these tasks. Moreover, statistical interaction of the data indicates that longer reaction times are involved in emotionally engaging conditions. Neuroimaging studies reveal that normative and affective aspects of tasks involve the posterior superior temporal sulcus and the lateral and ventromedial prefrontal cortex.

Dr. Prehn conducted studies to distinguish cognitive processes with respect to normative judgments, evaluating subject responses to questions and rating their reactions to grammatical moral transgressions and non-transgressions. The subjects' emotional arousal was measured by way of skin conductance data. The data indicated that, in judging grammatical transgressions and non-transgressions, different resources were involved. Next, the subjects were presented with affective prime paradigms in the form of emotional pictorial representations (of a violent crime in progress), which activated yet other resources in the brain. In the future, Dr. Prehn and Dr. Goodenough hope to extend their work to include several other parameters, including subjects with lesions on the prefrontal cortex.

Robert Frank presented a current paper of his, *Conflict of Interest as an Objection to Consequentialist Moral Reasoning* . Consequentialist moral theory holds that the justification for

an action depends only on the actions' consequences. The competing framework is deontological moral theory, which concedes that consequences matter but insists that basic moral principles must govern our evaluations. Prof. Frank explored responses to the Greene thought experiment of the large man and the runaway train, including an outright refusal to engage in such a cost-benefit analysis. He also described a thought experiment involving the use of a bequest in a manner contrary to the intent of the donor. Next, he addressed problems with the consequentialist point of view, especially as a moral framework for raising children. Prof. Frank is currently involved in research regarding spontaneous moral behavior, and related an anecdote regarding students' lack of willingness to come forward to report a grading error in their favor. In furtherance of his project, Prof. Frank offered consequentialist and deontological primes to student subjects, finding that most responded in accordance with the prime offered.

Prof. Frank described an experiment by Jason Dana et al. conducting alternate games where subjects clicked on the screen to allocate monetary reward between two others. The surprising outcome was that the great percentage of the subjects failed to perform a mouse click to reveal the underlying initial allocation. In other studies, subjects chose to split the monetary reward 50-50 with an anonymous partner when the partner expended more effort to earn the reward, but chose to allocate the larger share of the reward to themselves when they had expended greater effort to earn the reward. This appears to indicate that there is a large framing effect with respect to the choice of a consequentialist versus a deontological framework. Prof. Frank offered the view that the deontological path is more likely to result in the best result at a societal level.

Dr. Lawrence Frolik presented Law and Biology: The Triumph of Reality Over (Economic) Theory . Dr. Frolick distributed an ERISA case, *Mers v. Marriott* , concerning employment death benefits claimed by the widow of a Marriott employee who died while working on a company-sponsored Habitat-for-Humanity project. In *Firestone* , the Supreme Court had held that the federal court may conduct de novo review of the decisions of plan administrators unless the administrator is granted discretionary authority which can be overturned only where the decision is arbitrary and capricious. Following the decision, many plans were redrafted to preclude de novo review, in spite of the fact that few plan administrators are actually disinterested. The *Mers v. Marriott* case addressed the decision of an administrator with an actual conflict of interest, and whether a higher standard of scrutiny should be involved where an insurance policy interprets its own policies on the question of paying a claim. The 7th Circuit held that a stricter standard of scrutiny was not required, reasoning that a \$240,000 claim was not a sufficient motivation to

make an impartial decision.

Prof. Frolick asserted that, in light of what we know of law and biology, this was not a good result. Prof. Frolick argued that biases involving group dynamics such as loyalty, conforming behavior, and stress avoidance behavior can explain decisions based on partiality such as the Mers case.

Michael Heller of the Columbia School of Law presented his latest paper, *Conflicts of Interest in Property Law*. Property rules solve productive struggles between and among individuals with regard to despotic control over resources. These rules have developed in a number of ways, from laws of first possession to current law, to allow for autonomous individual decisions while fostering cooperation within the group. According to Prof. Heller, property law provides a fertile ground for understanding conflicts of interest which, in turn, provides a methodology for understanding property as an institution. Within this conflict-of-interest paradigm, Professor Heller has identified three general approaches to encourage decision-makers to take into account the interests of others: (i) internalizing externalities, (ii) democratizing resources, and (iii) de-escalation.

Across many types of property law are rules that limit the autonomy of the individual. Rules which require the internalization of externalities forces the decision-maker to take into account liabilities imposed on the group. Sometimes groups allocate transforming decisions to the group as a whole – the notion of democratizing resources – where the owner's self-interest may diverge from the group's interest. For example, condominium owners may not be able to alter or burden their property without consent from the condominium association. Finally, property law affords a range of tools for de-escalation at these times of conflict such as cooling-off periods or rights of refusal at times of entry or exit. These rules are all examples of conflict-transforming institutions which aggregate the interests of individuals.

The analysis of conflicts and the application of these tools depend on the nature of the underlying interest. Prof. Heller has identified certain patterns which emerge among property institutions, which are helpful to explain various property rules, ranging along a continuum of economic versus social interests. At the economic end of the spectrum, stakeholders are treated as absentee investors, maximizing profit while minimizing daily involvement in, for example, the sphere of individual use. For example, in a corporation, individuals normally have no access to the assets of the corporation. At the social end of the spectrum, stakeholders are considered to be

members of a purposive community which leads to concerns about over-use or under-investment of the group resource. Behaviors in this sphere are typically governed by a set of rules. In this context, government is often understood as a method of intensifying relationships, with emphasis upon joint management and voice. At the social end of the spectrum, however, people do not like decisions to be made in a formalistic way, but rather in more egalitarian, social ways. The market does not provide as much protection at the social end of the spectrum.

Jeffrey Stake of the University of Illinois presented his idea of A Property Interest. Prof. stake suggested that the distinctions that we find in property law have antecedents in cognitive distinctions with respect to property.

Susan Crawford of the Cardozo School of Law presented an outline of a project she is starting, called People, Bits, and Atoms . Prof. Crawford discussed several recent decisions which undermine the idea of fostering what she calls metainformational depth.

This program ended with a panel discussion on **Law/Science Questions** .