Fall 2013
Report 19

the Center for Ethics in Science & Technology

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Message from the Director

This past year has been a busy one for the Ethics Center and this update is long past due.

For our Exploring Ethics forums at the Fleet Science Center, in June we finished an informative and engaging series on Rachel Carson's seminal book *Silent Spring*. Although published over 50 years ago, it was repeatedly made clear by our speakers just how relevant Carson's themes remain today. The series was followed by a program in August co-organized with the Fleet Science Center on the subject of unmanned autonomous vehicles (UAVs) or drones. If you missed those programs, please follow the links from our website to see the UCSD-TV productions now archived. We continue to be astounded by the public reception for these programs that are receiving an average of over 40,000 views each.

Now we are well into the 2013-2014 series of programs, most of which will be dedicated to Siddhartha Mukherjee's *Emperor of All Maladies*. The first program, featuring acclaimed journalist Clifton Leaf, was held in October and resulted in a lively discussion about what has been done right in the research efforts to meet the critical challenge of cancer as well as ways in which the enterprise might be strengthened. The series will continue with 6 or 7 additional programs now being scheduled. The first of those, scheduled for December 4th, with Razelle Kurzrock of the Moores Cancer Center will provide a cutting edge view of the use of genomics to personalize cancer treatment. Be sure to RSVP soon for this program as well as the others that are and will be posted on our website.

In addition to our annual series of programs, the Ethics Center was invited to co-organize a special program in November with the International Neuroethics Society. The subject was neurogaming, a fascinating field in which scientists and programmers are collaborating on videogames for therapy and education.

Last, but not least, we were privileged to oversee another ethics essay competition with the COSMOS program at UC San Diego. This program brings high school students to UCSD for a summer experience to learn about and practice science. However the program also recognizes the important link between good science and good ethics by assigning all students to write an essay about ethics in the context of the science they are studying. Once again, we were thrilled with many of the essays written by these future scientists and are happy to announce the winners in this newsletter.

Michael Kalichman, Director
Center for Ethics in Science and Technology

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SILENT SPRING SERIES: SILENT SPRING + 50: LESSONS FROM SAN DIEGO'S BEES AND BAYS

FEBRUARY 6, 2013

JILL WITKOWSKI, SAN DIEGO COASTKEEPER
JAMES NIEH, PH.D., UC SAN DIEGO

The **third** forum of the Ethics Center's *Silent Spring Series* provided an overview of problems affecting the environment in San Diego and the world. Featured speakers were Jill Witkowski, Waterkeeper for San Diego Coastkeeper, and Dr. James Nieh, Professor of Ecology, Behavior and Evolution at UC San Diego.

Dr. James Nieh and Jill Witkowski

Witkowski introduced numerous environmental problems affecting San Diego bay sites and suggested actions that residents can take to mitigate the damage. According to Witkowski, several factors have contributed to detrimental changes to the ecosystems and contamination in the bay sites. Witkowski explained that, in areas like San Diego, one of the most prevalent causes of water contamination and environmental damage is "urban drool," the aftereffects of overwatering lawns, malfunctioning sprinklers, and heedless car washes. Run-off containing pesticides such as diazinon and pyrethroid is washed into our bays. Large amounts of these chemicals have been found in San Diego bays, like Chollas Creek. These pesticides harm the plants, soil, and the people who breathe the airborne pesticide particulates. Witkowski presented actions that the community could take to mitigate these harms: pick up after dogs, avoid fertilizing before rain showers, and soak up oil with cat litter.

Dr. Nieh, who studies honeybees at UC San Diego, identified another prominent environmental problem that has become increasingly serious: Colony Collapse Disorder (CCD). In 2010-2011, winter colony losses amounted to nearly 30%. The loss of bee colonies has been highly detrimental for crop-harvesting. For example, 1.5 million colonies are needed to pollinate almond crops alone every year. Because 70-80% of colonies interact with one another in a single location to pollinate crops, diseases that arise from pesticides quickly spread among the colonies. Several pesticides are responsible for causing bee death, affecting bee learning and mental health and their ability to migrate home. Pyrethroid, a chemical in pesticides, spreads to all tissues and cells of the structure of the plant. When bees drink the nectar of a plant, they drink the toxin and concentrate it in the honey.

Nieh emphasized that educating people in the community about the dangers of CCD is essential in solving the problem. In addition to operating his research lab, Nieh also has an online program called "The Teaching Bee" for younger students to learn about the ecology and behavior of honey bees. Together, through knowledge and changes in social practices, we can alleviate the severity of some of these problems.

SILENT SPRING SERIES: GLOBAL CLIMATE CHANGE AND EMERGING INFECTIOUS DISEASES

MARCH 6, 2013

STANLEY MALOY, PH.D.

The **fourth** *Silent Spring* program featured a presentation by Dr. Stanley Maloy of San Diego State University. Dr. Maloy serves as the Dean of College of Sciences at SDSU as well as a Professor of Biology.

Maloy noted that "climate change confronts serious ethical issues of fairness and responsibility across individuals, nations, generations, and the rest of nature."

Perhaps the environmental problem that is most on the media frontlines today is global warming. Dr. Maloy highlighted many human activities that have been influential in altering our global climate. Rachel Carson's work also focused on the long-term effects of environmental disruptions. *Silent Spring* serves as a stimulus for scientists and researchers to perceive seemingly distant problems, like global warming, as imminent and in need of immediate attention.

Dr. Stanley Maloy

Dr. Stanley Maloy and Alan Sweedler
Director of SDSU Center for Energy Studies

According to Maloy, the real-time impact of climate change is that it increases terrestrial temperature and the distribution of vectors, leading to the spread of diseases such as malaria, dengue fever, chagas disease, and Lyme disease. Cholera is also more common in areas of increased temperature. Changes in the water cycle increase the occurrence of water borne diseases such as salmonella.

Small changes in temperature make humans dramatically more vulnerable to diseases. A one-degree change makes humans 15% more vulnerable to malaria because the heat increases the lifespan of mosquitoes. When sea surface temperatures increase, there is an increase of 5% in humans who contract cholera infections.

In addition to generating widespread diseases, temperature changes also alter the water cycle. For example, increased rainfall provides a breeding ground for mosquitoes, and a drought followed by heavy rains promotes the overpopulation of mice. In presenting the ramifications of even subtle changes in the global climate temperatures, Maloy stressed the ethical implications of human actions causing changes in the global climate.

ELEPHANTS OR PEOPLE? ETHICAL DILEMMAS IN RECOVERING ENDANGERED SPECIES

APRIL 3, 2013

ROBERT WIESE, PH.D.
CHIEF LIFE SCIENCES OFFICER, SAN DIEGO ZOO GLOBAL (SDZG)

In the **fifth** program of the Ethics Center's *Silent Spring* series, Dr. Robert Wiese, Chief Life Sciences Officer of the San Diego Zoo Global (SDZG), addressed the ethical dilemma of preserving endangered species, particularly when some species at times present threats to other native species, crops, livestock, and even humans. In some cases, reintroduction of a species in a particular habitat in turn harms other native species. Other times, the preservation of a native species requires the eradication of an invasive species.

Dr. Robert Wiese

Dr. Wiese first discussed the endangerment of the California Condor, a species he first saw in 1969 when there were only 50 or 60 birds left in the world. In 1982, there were only 22 remaining. After a long debate over the preservation of the species, zoos in Los Angeles and San Diego took the remaining California Condors into private breeding facilities. As a result, there are now more than 400 California Condors in the world.

Dr. Wiese said that an overarching ethical question about species preservation is whether or not we should recover a species if we are responsible for its decline.

Dr. Robert Wiese and Ethics Center Director Michael Kalichman

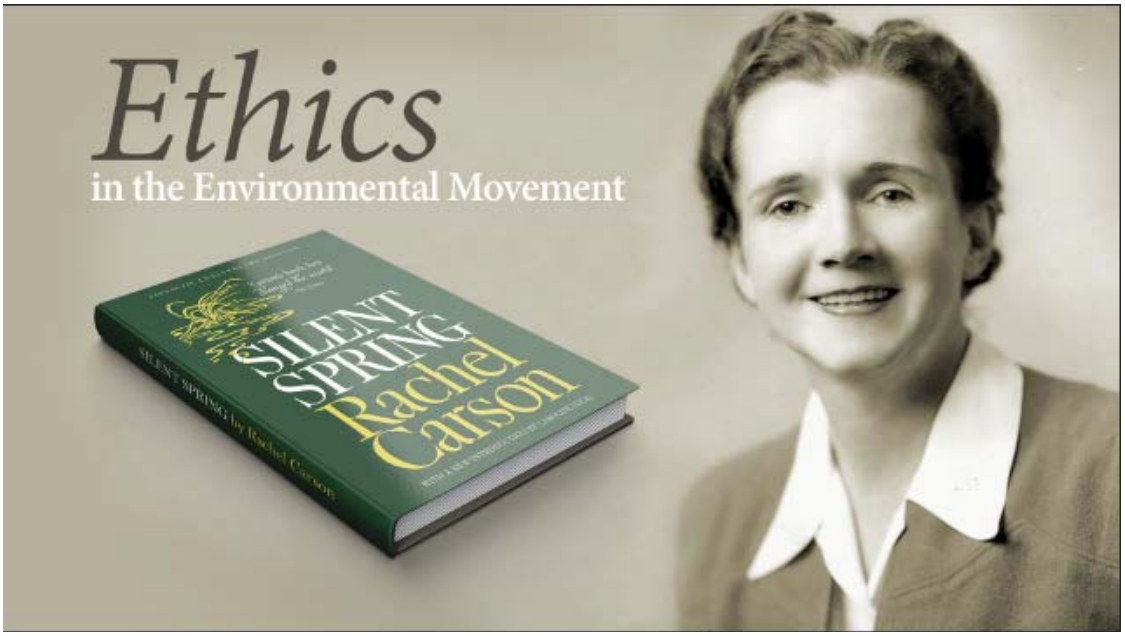
In the case of African elephants, species preservation has a deep cultural implication. Today, there are fewer than 500,000 African elephants left in the wild. Most have been lost as a result of ivory acquisition by Asian countries where ivory carvings are popular. Other elephants are killed by African farmers whose crops – or income – are in danger of being destroyed by elephant herds. Wiese presented the cultural and economic trade-offs of preserving endangered species. Is it more important to value human survival at the cost of elephant endangerment? Should conservation affect the livelihoods of local farmers and residents?

Rachel Carson observed in *Silent Spring,* "All have this in common: they are biological solutions, based on the understanding of the living organisms they seek to control, and the whole fabric of life to which these organisms belong."

SILENT SPRING AND STUDENTS

MAY 1, 2013

MODERATOR: TATE HURVITZ, PH.D. GROSSMONT COLLEGE



At this month's event, the winners of the *Silent Spring* Essay Contest were the focus of the evening. Prior to announcing the winners, the contest coordinator, **Dr. Tate Hurvitz**, offered a short overview of the contest including the essay call, the judges and a brief overview of each participating college's student winner and her essay, focusing in on the ethical concerns at the heart of each one.

Then, the audience broke into groups, each with a series of central quotes from the essay they were discussing. The next 15 minutes were spent in lively discussion of the students' essays, which offered a range of topics, including landfill safety, ecosystem balance, genetically modified organisms, and alternative energy sources.

Finally, the groups shared their comments and thoughts while the rest of the participants added to the conversations with new questions and insights. The conversation was stimulating and the student essayists were thoughtful and eloquent participants throughout the evening.

In the end, the winners were announced and the awards were given out.

1st place, $600. **Emilee Ramirez**, CSUSM. "Landfills: The Breakdown"

2nd place, $300. **Danielle Jesse**, USD. "Genetically Modified Organisms Could Spark the Next Social Movement"

3rd place, $150. **Miranda Ko**, UCSD. "For My Children, Before it is too Late"

3rd place, $150. **Minerva Munoz**, Grossmont. "Consider and Take Action to Help the Earth"

SILENT SPRING SERIES: WOMEN IN SCIENCE

JUNE 5, 2013

LYNNE FRIEDMANN, CHRISTINA DECKHARD, DOROTHY SEARS

The **sixth** program in the *Silent Spring* series began with an introduction by **Dr. Stanley Maloy** who asserted that when addressing Rachel Carson's legacy, as well as ethical issues in science, it is necessary to discuss the challenges women scientists have faced and what we can do to break down barriers for the next generation. Three women, from various disciplines, spoke about their personal experiences being involved in science and strategies they believe will bring about real change.

Lynne Friedmann

Lynne Friedmann, marine biologist, journalist and founding board member of Athena San Diego, an organization fostering professional growth for women executives, shed light on the specific characterizations journalists used when discussing Rachel Carson's work, and illustrated how these stereotypes are still at work today. Most publications at the time focused on Carson's gender rather than her ideas or data. One author began an editorial about her by writing "she is small and slender with chestnut hair and eyes." With this context, Friedmann argues that even today, women scientists are still portrayed using clichés. As consumers of media, she believes we all should be aware of these biases and by critiquing them discourage this kind of tone.

Christina Deckard

Biases portrayed in scientific writing have had the effect of discouraging young women from pursuing careers in the sciences, but **Christina Deckard**, with graduate training in physics and mathematics and 25 years as an employee of SPAWAR Systems Center, believes this can change if we intervene early in the lives of young women. Deckard shared her own personal journey which began when a chemistry teacher at San Diego State University encouraged her to attend a Thomas Edison celebration event in which she was fascinated by a presentation on holograms. This spark drove her to seek out more math classes and eventually pursue both her masters and her long career, despite many telling her it was impossible. It is the older generations' responsibility to make a difference by inspiring this sense of wonder in more young women before they reach college age.

Dr. Dorothy Sears, professor from the UCSD School of Medicine and President of the Association for Women in Science San Diego Chapter, further emphasized the need to reach out to young women to counter their underrepresentation in science. Women must provide mentorship and guidance to show young women that opportunities for them do exist. The Association for Women in Science commits to this goal by providing scholarships to young women interested in science, with recipients going on to attend universities such as Harvard, Stanford and MIT. Though the money was helpful to them, in the end it was the guidance and support they received that truly made the difference in their career trajectories.

Dr. Dorothy Sears

During discussion with the audience, it was noted that it is not just men who need to understand their own biases, but women, who have been shown to be gender biased in their own hiring practices. Overall, our three speakers believe that women have faced unfair disadvantages in the science fields, and that it is a responsibility for all of us to reach out to young women by nurturing their interest in science.

DRONES AND OTHER UAVs: BENEFITS AND RISKS

AUGUST 7, 2013

LUCIEN MILLER, KEITH M. McLELLAN, BOB OSBOURNE

This August 7th forum opened with moderator Larry Hinman, Professor of Philosophy at UC San Diego emphasizing that in order to take on the difficult ethical issues of this emerging technology we must begin with perspectives of those working with UAVs, otherwise our discussions risk being riddled with distortions.

The first of our speakers, **Lucien Miller**, CEO of Innov8tive Designs, focused on common concerns about UAVs and emphasized that these concerns will likely be outweighed by the potential benefits of the technology. He believes the word "drone" carries a very negative and militaristic connotation simply because this is how the technology has mostly been used in the past. There are many different applications for this technology, including life-saving rescue efforts, infrastructure inspection and even endangered species protection. Overall he says that people go through five stages when they are confronted with a new type of technology: first they are ignorant of its existence, then they deny its importance, then they react with fear, but eventually people accept and then understand how the technology can be used for the betterment of society. With responsible use and regulation, Miller believes the technology itself has enough to offer that, with greater education, society will certainly reach this level of understanding and enthusiasm in regards to UAVs.

Our second panelist, **Keith M. McLellan**, CEO of ROV Systems, sees a similar trend in the fear based discourse surrounding UAVs, and blames the media for this representation. He asserts that most people are unaware of the many laws governing aerial privacy since the 1950s. With increased awareness their rights, much of the paranoia about UAV technology can be decreased. For example, for commercial use of UAVs, any use that invades someone's privacy would be subject to legal ramifications. Overall, McLellan argues that "it's not the technology itself, but how it's used." Some potential endeavors, which can be done for a fraction of the cost of a manned aircraft and without risk to a pilot, are the deliverance of medical supplies, Coast Guard rescues or finding people in the rubble of a tornado. He believes perceived privacy concerns are a small price to pay for these life-saving efforts.

Finally, retired Commander **Bob Osbourne** of the Los Angeles County Sheriff's Department provided special insight into the value and limitations of UAVs for public safety. Currently, the LAPD does not own UAVs because the regulatory issues were too difficult to overcome. Some of these regulatory issues include laws which prohibit UAV use where it is not visible to a pilot or where a manned aircraft is being flown, in addition to the fact that UAVs are often overengineered for public safety and thus, ironically, cost too much money for many public safety departments. Despite these current limitations, Osbourne sees the potential for many applications such as finding suspects in an area search without sending in armed officers or understanding crowd dynamics in large scale public events. Concerning safety, Osbourne assures that before these aircraft are used in a civilian capacity they will be held to high safety standards and will always depend on the skill of a trained pilot. Similarly, before the proliferation of this technology, courts must decide on how data collected by drones will be stored, for how long and if a warrant would be required for flying over houses not involved in a particular incident. Overall, he believes that the public has a right to decide how they are policed, but that these decisions have consequences. Denying police officers the ability to use this technology could be detrimental to public safety

From left: Bob Osbourne, Keith M. McLellan and Lucien Miller

Larry Goldstein, Ph.D.

Professor, Molecular Medicine, Director, UCSD Stem Cell Program

Dr. Goldstein is a Distinguished Professor in the Department of Cellular and Molecular Medicine and the Department of Neurosciences at UCSD. He is also the Director of the UC San Diego Stem Cell Program and Scientific Director at the Sanford Consortium for Regenerative Medicine. His research is focused on understanding the molecular mechanisms of intracellular movement in neurons and the role of transport failures in neurodegenerative diseases. His lab has discovered important links between transport processes and diseases such as Alzheimer's Disease and Huntington's Disease. Dr. Goldstein has also had an active role in National Science policy, and has testified on a number of occasions in the U.S. House of Representatives and the Senate about NIH funding and stem cell research.

Five years after your 2008 discussion in the Exploring Ethics series, what are some new questions in stem cell science?

As of today I would say that the most important ethical questions revolve around the appropriate use of stem cell therapies in humans and where the risk-benefit ratio should be for first in human trials with embryonic stem cells and different sorts of adult stem cells in different types of diseases. For example, in ALS the risk-benefit profile is such that these patients may be willing to tolerate quite a high degree of risk in first in human trials relative to what a spinal cord injury patient or type I diabetic might be willing to take. Pediatric populations are particularly challenging. Remember, once cells are transplanted, in many cases they will be hard to remove. Other questions revolve around the ethics of consent for donation of tissue for research and for the banking of such tissues and their use in long-term genomic and stem cell research.

Have concerns over the ethics of embryonic stem cell research lessened or changed over time?

Although controversy about stem cells derived from frozen human embryos will probably never go away entirely, my perception is that the issue is not gone, but other issues have become more important such as clinical trial issues.

What "returns" can California expect on its investment in the new Sanford Consortium facility?

We have a group of scientists dedicated to studies of autism, various types of cancer, ALS, Alzheimer's disease and many more. In the next 5 to 10 years we can expect to see new drugs and cell therapies entering clinical trials as a result of these investigations as well as new companies being launched that will provide economic return to the state.

The Sanford Consortium "Collaboratory" exemplifies San Diego's culture of inter-institutional collaboration. How do you explain that culture?

San Diego indeed has an amazing scientific culture of collaboration and cooperation. I'm not entirely sure how to explain it other than to compare the culture here to environment at Harvard which is where I was previously a faculty member. Partly, we are a younger set of institutions and so have to work together and don't have many decades or centuries of history of going it on our own. I think the weather contributes as well. Mild weather promotes the movement and unexpected collisions of people and interactions/communication!

What are some of the challenges to successful collaboration across academic disciplines, particularly across the sciences and the humanities?

Collaboration across the sciences and humanities are obviously complicated by the lack of a shared language of discovery or creation and the fact that many disciplines tend to be jargon heavy in addition to concept heavy. I think another difficulty is that we just don't bump into each other enough. My experience is that regular interaction among academics who have baseline respect for each other will lead to interesting conversations which in turn lead to interesting intellectual collaborations.

EDUCATIONAL PARTNERSHIP: COSMOS ETHICS IN SCIENCE AWARDS 2013

August 2013

The **UCSD COSMOS** (California Summer School for Mathematics and Science) recently awarded certificates and cash prizes to high school participants who competed in the 3rd Annual Center for Ethics in Science and Technology Essay Competition. Over 160 students submitted essays covering ethical considerations of their final science or engineering research projects. A panel of judges from San Diego's Center for Ethics in Science and Technology determined First Place essays for each cluster, and a Grand Prize essay winner.

The Grand Prize winning essay discussed the ethical implications of using fetal bovine serum as a medium in cell cultures. Dahnby Jun, of South High School, argued that the techniques used to harvest fetal bovine blood, a medium used to provide essential nutrients to cell tissue culture, are ethically questionable and thus undermine the "humane" purpose of growing cells to reduce animal testing.

Pictured are the first prize winners from each cluster. Back row, left to right: Dahnby Jun; Heidi Peterson; Daniel Arnold; MacKenzie Lighterink; Calvin Tsai; David Higgins, UCSD Ethics Center. Front row, left to right: Sonya Jacobs; Hector Arias; Po Tsui; Charles Tu, Director, COSMOS UCSD.

OVERTHROWING THE EMPEROR OF ALL MALADIES: Moving Forward Against Cancer

2013-2014

Program Description

The Ethics Center and its partners have organized a series of programs and activities in 2013-2014 to foster conversations between the public and the scientific community about the ethical challenges raised by new developments in science and medicine for prevention, diagnosis, and treatment of cancer. The Ethics Center once again leads multiple San Diego universities and colleges and the Reuben H. Fleet Center in hosting a series of programs organized around a common theme. The focus for the 2013-2014 year is one of the defining medical challenges of our time: Cancer. To frame this year's programs and activities, we have chosen *The Emperor of All Maladies*, a Pulitzer-prize winning overview of cancer highlighting historical, social, medical, and scientific perspectives. Free, public programs and events throughout San Diego will address essential questions about how we should conduct research about cancer and how we should use the technologies that we are developing.

Co-Chairs

- Michael Kalichman, Director, Center for Ethics in Science and Technology
- Ivor Royston, Founding Managing Partner, Forward Ventures
- Mary Walshok, Associate Vice Chancellor for Public Programs and Dean of Extension, UC San Diego

For more information about scheduled programs and activities, please visit the Ethics Center website at: http://ethicscenter.net

Steering Committee

- Amy Adome, SVP Clinical Effectiveness, Sharp HealthCare
- Colette Carson, Oncology nurse clinical specialist/consultant
- Darrel Falk, Professor, Point Loma Nazarene University
- Tate Hurvitz, Associate Professor, Grossmont College
- Jeffrey Kirsch, Executive Director Emeritus, Reuben H. Fleet Science Center
- Scott Lippman, Professor of Medicine, UCSD and Director, Moores Cancer Center
- Stanley Maloy, Dean, College of Sciences, SDSU
- Garth Powis, Professor & Director, Cancer Center, Sanford-Burnham Medical Research Institute

LESSONS FROM A ONE-EYED SURGEON

October 2, 2013

CLIFTON LEAF

The **first** Ethics Forum in the "Overthrowing the Emperor of All Maladies: Moving Forward Against Cancer" series featured author **Clifton Leaf** sharing the compelling story of Denis Burkitt. Leaf used Burkitt's story to motivate his call for changes in how we conduct cancer research.

Author Clifton Leaf

Dr. Denis Burkitt was chief surgeon at a hospital in Uganda when a five year old boy named Africa was brought into the hospital with tumors in his mandible, maxima and abdomen. Burkitt could do nothing to save the child, and after this case he began to notice other children who had the same condition. After consulting records for his hospital, he determined that these tumors were surprisingly common, and though they had been classified according to their differing locations, they were all the same cancer. Inspired, Burkitt and colleague Ted Williams, decided to take a 10 week journey through Africa in order to perform a sort of "geographical biopsy" on the disease. In that time Burkitt and Williams found 200 examples of these tumors, and were able to create a map of incidences, which illustrated a geographical pattern similar to that of malaria. Though the tumors were clearly a cancer, they seemed to behave like a virus. While giving a conference on the mysterious cancer, Burkitt met Tony Epstein, who introduced him to the idea that a virus could be transforming cells to become cancerous. After identifying this virus, Burkitt sent the data to a wide network of hospitals and scientists, creating "sprawling partnerships all over the world." After understanding that viral and parasitic cofactors worked to transform the cancer cell, Burkitt and his associates were able to develop a cocktail of medications which sent Burkitt's lymphoma into remission and saved the lives of many children.

Cliff Nelson, Ted Williams, Denis Burkitt and their 1953 Ford Jubilee near the start of their "Long Safari," October 1961

Over the next 60 years, little more has been discovered about Burkitt's lymphoma. Though at first there was much excitement about solving this puzzle, even Burkitt eventually moved on to study other diseases. Burkitt lymphoma is still endemic in Africa and the cost for treatment is still astronomical.

Leaf's work over the last ten years has focused on examining the culture of science and how it has changed since Burkitt's collaborations with Williams, Epstein and an array of regional hospitals. Most importantly, the culture of scientific exploration has changed such that there are perhaps too few genuine global collaborations of the sort that helped Burkitt look at the disease with a new perspective. Leaf argued that this is due to a grant system that creates incentives for aggressive hoarding of data, scientists engaging only in a slow motion collaborative process by reading each other's papers. Secondly, Leaf believes we lack a sense of medical urgency about cancer. Though the burden of cancer grows heavier each year, the problem has grown so large and so common that we have lost sight of the criticality that drove Burkitt to spend 10 weeks on an odyssey through Africa trying to find a cure.

During the lively discussion, Leaf stressed the importance of funding both prevention and treatment measures. He also pointed out the need to continue to open up a dialogue about these issues and to reimagine what a truly collaborative academic research and funding enterprise should look like.

NEUROGAMING:
What's Neuroscience and Ethics Got to do With it?

NOVEMBER 7, 2013

SHAWN GREEN, ADAM GAZZALEY, JONATHON BLOW

This special event represents the collaboration between the Center for Ethics in Science and Technology and the International Neuroethics Society. Steven E. Hyman, founding President of INS, moderated the discussion among three experts from the scientific and game development community about the role video games can play in advancing educational and therapeutic innovations.

Shawn Green, Adam Gazzaley, Jonathon Blow and Steven E. Hyman

C. Shawn Green from the University of Wisconsin, Madison opened the panel by examining the scientific basis for neurograming. Green first clarified that when the media publishes studies which judge video games as being generally good or bad, it ignores the reality that there are different kinds of video games. Video games require varying amounts of visual attention and have different levels of aggression involved, which can effect a variety of factors including levels and types of brain activity as well as propensity for addiction. Playing certain types of video games, particularly action games, has been shown to have many benefits including improving spatial cognition, which can have practical applications in the treatment of dyslexia. Overall, certain games allow people to learn incrementally in a rich environment that not only fosters exploration and allows for error, but can inspire self-confidence and a desire to learn.

Adam Gazzaley, professor at the University of California, San Francisco, asserted that video games are the most powerful form of media that there is because while being interactive, in most cases they are also fun. He believes video games have the capability for a deep and positive impact, beyond entertainment. Specifically, he argues that when it comes to cognition, or the processing and organization of information, gaming can provide an amplification of these abilities in both educational and medical contexts. His lab has teamed up with experts in video game development in order to create the game NeuroRacer. The game is an immersive experience in which players have to perform two tasks: staying on the road and responding to prompts that appear on signs alongside the road. Gazzaley and his team found that training made an older brain look younger by increasing the brains' ability to multitask. Even more impressively, these skills were preserved for longer than six months and increased the ability of other cognitive functions. New ethical questions will arise, he said, as technology develops to allow brain imaging results to alter video game environments in real time in order to create a feedback loops that activates certain circuits and put pressure on different brain processes.

Jonathon Blow, an independent game developer from San Francisco, provided insight into another aspect of this relationship between neuroscience research and game development. Blow believes there is a problem with the fact that so many educational games are just not fun, and because these games are boring they are not effective mind enhancing tools. A game like Counter-Strike, he argues, is much better brain training software than most "educational" games. When playing this action game, for instance, a shot in the distance requires players to use spatial recognition to locate the origin of the sound on the map and then quickly alter their strategy accordingly, while taking into account other independent player's actions. From an ethical perspective, Blow is concerned by the fact that companies are capitalizing on the engaging nature of video games. Facebook games, for example, harness many of the same addictive qualities as slot machines, and are increasingly encouraging players to spend real money in the game. Companies are incredibly interested in neuroscience research, Blow asserted, because they profit from exploiting science, which will happen more and more as companies have access to data about our interests and internet habits.

the Center for Ethics in Science & Technology

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Ethics Center in the News

"The Immortal Life of Henrietta Lacks" on Wisconsin Public Radio

Author Rebecca Skloot and Center for Ethics Center Director Michael Kalichman discussed an agreement the NIH reached with the family of Henrietta Lacks. The full podcast can be heard on our website.

October Exploring Ethics Forum Featured in San Diego Union-Tribune

Author Bradley J. Fikes covers the "Lessons from a One-Eyed Surgeon" Ethics Forum in an article entitled "Focus on Grants Limiting Cancer Research: In La Jolla, Clifton Leaf says free time promotes creativity." The full article can be found on our website.

La Jolla Light reviews "Lessons From a One-Eyed Surgeon"

An article titled, "Author to Describe War on Cancer" raises ethical questions concerning cancer and the power of scientific collaboration. The full article can be found on our website.