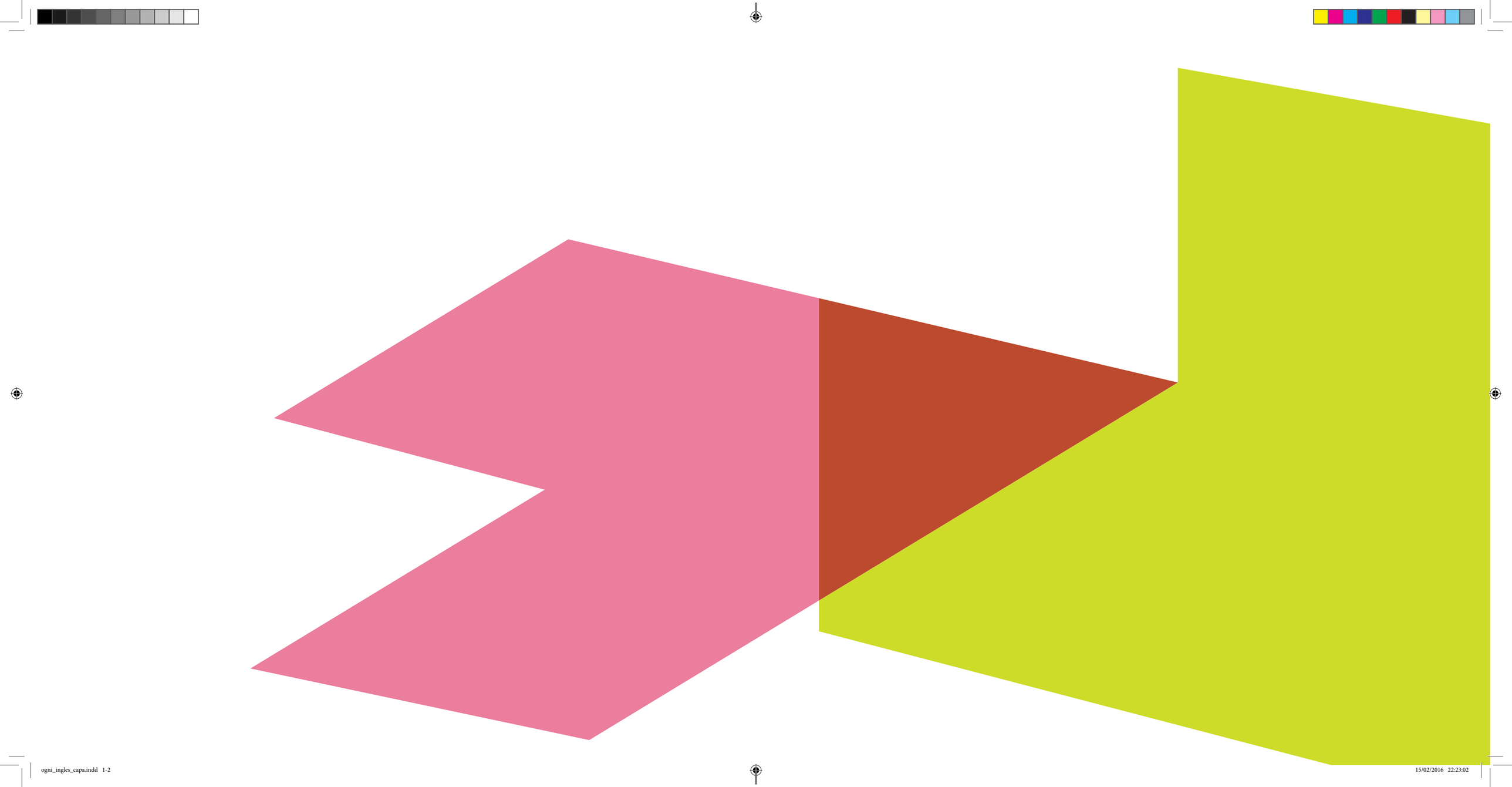

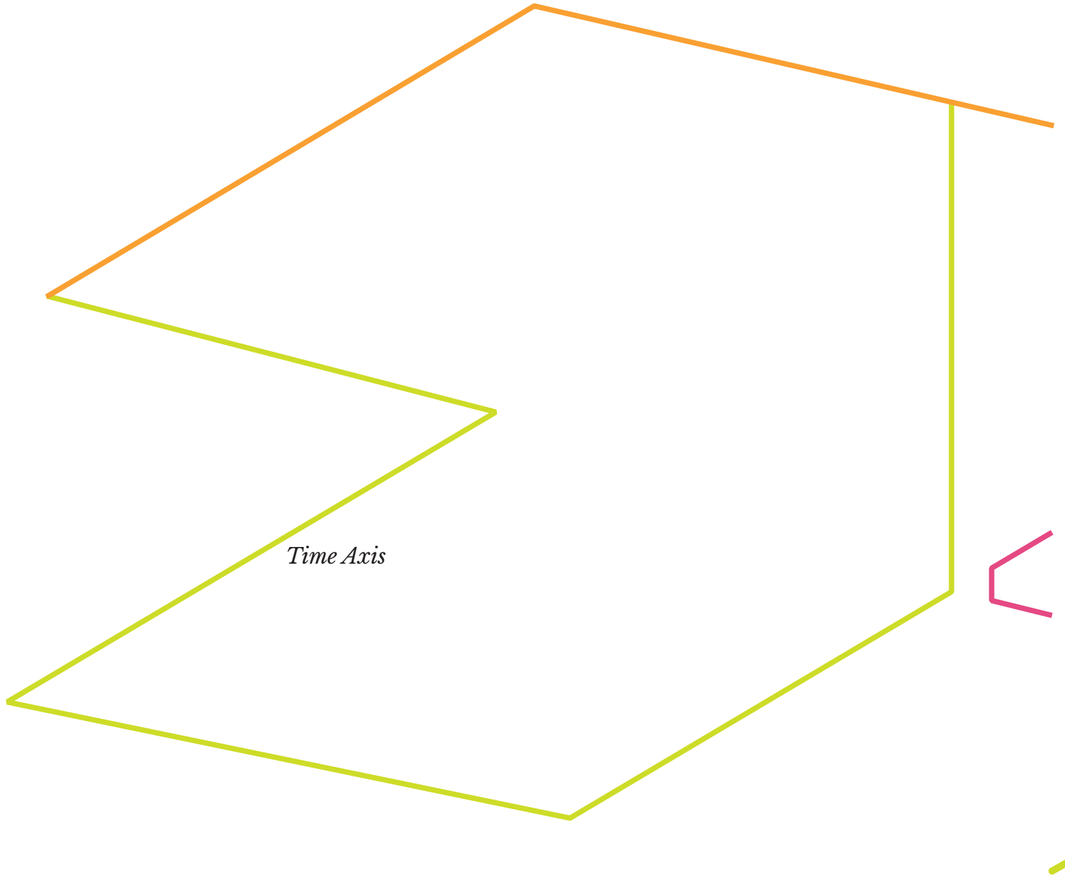

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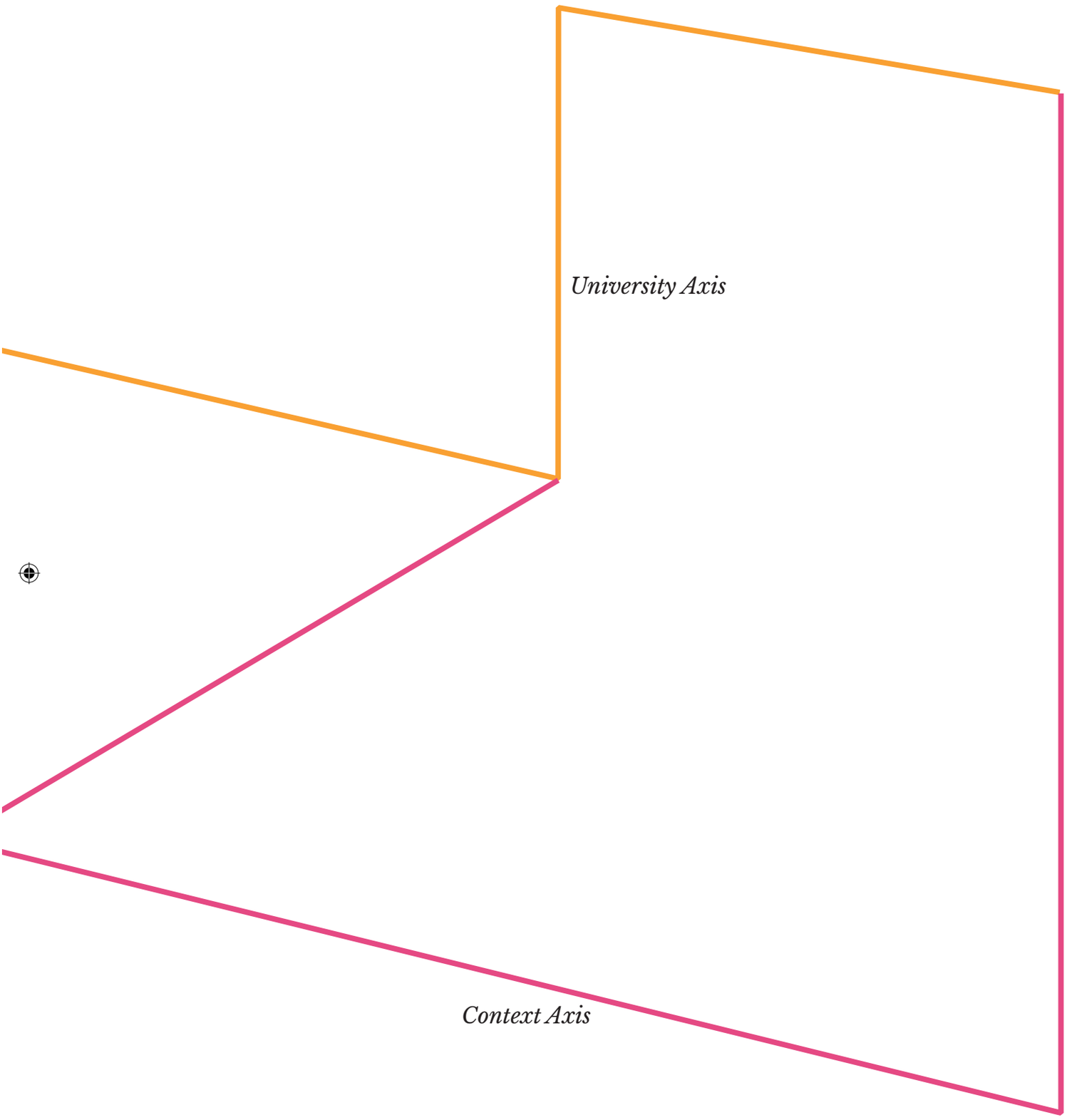

Sailing the Times of São Paulo: Collective Effort, Audacity and Multiculturalism

by Gonzalo Iparraguirre

http://ica.usp.br/docs/sailing-the-times

São Paulo, April 18 & 19, 2015

Coffee and palm trees, parks, avenues, buildings, cathedrals, rivers, museums, paintings, graffiti, people, vehicles, football, favelas, sounds and noises; São Paulo is presented to us in a shocking, monumental and polychronic way: we are introduced at once into its past and its present, we access its history while we understand how it came into being, in the words of our expert guide and host of the ICA in São Paulo, Professor Martin Grossmann.

We began the scientific and cultural tour furrowing the city by bus, driving through kilometers of cement, cars and palm trees. The contrast between the green tones of the dense vegetation and the gray tones of the magnificent buildings creates a score of simultaneous dissonance and harmony. The absence of advertising in the streets allows us to appreciate in detail the amalgam between centenary architecture and contemporary industrial design.

After visiting the Independence Park and the surrounding palaces, one can understand

that the urbanization of São Paulo was a clear attempt to domesticate nature. The transformation of rivers into underground cement canals, of native forests into enclosed parks and of hills into uncountable edifices expresses the materiality of the ideals of an aristocracy that believed wilderness should be tamed, that the indomitable nature of the tropics could be controlled. This made it possible to create the city, to dominate it and to inhabit it.

Brazil is rooted in aboriginal cultures that date more than 12,000 years. Besides the hundreds of indigenous Amerindian and African peoples that faced – and still face – colonization, many ethnicities took part in the construction of a globalized mega-nation. The cannibalism attributed to some Amazonian tribes can be interpreted today as a metaphor of the multicultural exchange that traverses the city as one of its identifiable features: feeding on other cultures to build one's own. Martin mentioned this idea to explain the history of São Paulo's cultural heritage, from the architecture of public buildings to the structure and design of the Schools of the University of São Paulo.

This idea turned up again later, when we listened, through the hands of young pianists from USP, the music of Brazilian composer Alexandre Levy (1864-1892). Listening to the piece "Brazilian Tango," I recognized the 2x4 tempo of Buenos Aires' tango milonga, and the mixture of tango and classical piano referred me to Piazzolla, the great Argentine composer who was able to devour the rigid tradition of the tango and create a new musical being, called the "New Tango," integrating timbres and rhythms of classical music and jazz.

I then thought of the artistic anthropophagy required to compose art or science beyond the traditions and schools that form and limit us, what in science often defines the epistemological threshold – or paradigm – from which it is not easy to escape, or even to face. To create art beyond the limits of traditions and contexts of epoch was the idea that Levy's music conveyed to me, resonating with the spirit of the ICA event of bringing various researchers from around the world to creatively discuss new ways to investigate the ubiquitous problem of Time, as well as the challenge of rethinking academic life in its social and academic contexts.

São Paulo has reinvented itself several times thanks to its cultural cannibalism – and continues to do so. When visiting USP's Museum of Contemporary Art (MAC-USP), we witnessed, in addition to a formidable art exhibit and a panoramic view of Ibirapuera Park, a performance of musical anthropophagy: the mega-city noise filtered through the pharaonic walls of the museum and turned into quadraphonic sound, a poetry spiral that repeated itself in changing patterns, as in a Bach fugue, but implemented by electronic pulses, cables and magnetic speakers. The sonic culture of São Paulo, nurtured on samba and on baroque music, has managed to digest the dissonances and arrhythmias of the 21st century urban jungles, and has also been bold enough to capture its lush fidelity and intercultural language. This is another of the resonances that echo the melody running through the ICA participants in São Paulo: audacity, fidelity, multiculturalism.

The landmark and scientific imaginaries of São Paulo combine in an intercontinental mode; the ethnic diversity enters and disperses throughout the land, like the rivers that cross the city to reach the entrails of the earth. The landmark imaginaries not only appertain to the hybridization of architectural styles and the multiple forms of urban expressions, but are also part of the communities and neighborhoods of Portuguese, Japanese, Bolivian, Paraguayan, and Korean populations, among many others. São Paulo is, in this sense, a multiethnic nation in itself, bringing together nationalities from all over the planet.

Regarding scientific imaginaries, the University of São Paulo managed to further the education of its first graduates in different universities of the US and Europe to plan the creation of its own faculties, leveraging their vast experience, which in turn was used to develop public policies that gave voice to the demands of a city in constant growth. This pluri-ethnic and academic landscape that allowed USP to grow over the last 80 years and establish research centers like the IEA frames the Atlantic horizon where the participants of the ICA may conceive and develop a new dawn of science without borders (national, ethnic, academic or economic).

We ended the two days of our exhausting Paulista tour by visiting the Nutritional Education and Recovery Center in the Vila Medeiros favela. As we listened to the celebrations with shouts and pyrotechnics coming from the houses of the goals of the match between Palmeiras and Corinthians, I read a 50-meter graffiti on a huge wall that captivated me: "We will not be forever, but we will be always sailing the times of eternity." An excellent phrase not only to reflect upon the philosophical dilemma of time, life and eternity, but also to make us willing to create change and remain positive even in the most hostile sociocultural conditions, or in the least expected places. The ICA in São Paulo inspires us to be strong from each of our own small places in the world and to be aware of the collective effort that means being part of an intercontinental network of collaborative academic work. □

On the Size of Time: a report on the first day of the Intercontinental Academia

by Julia Buenaventura

http://ica.usp.br/docs/size-time

São Paulo, April 18 & 19, 2015

The first day of conferences of the Intercontinental Academia, April 20, gave us a counterpoint that might best be described as the contradiction between nearsightedness and farsightedness. Two opposing kinds of personality: one is unable to see clearly what lies in the distance and so approaches each letter as if it were examining ants; the other cannot see what is close at hand, so sees printed matter as if it were looking at stars. The nearsighted enjoys details; the farsighted loves the landscape.

This dichotomy can also be described as the one that exists between a magnifying glass and a spyglass, between a microscope and a telescope, or even between chemistry and physics. Chemists love loupes; physicists, needless to say, having Galileo among them, adore telescopes. Something tells me, as a matter of fact, that physicists must be myopic and chemists hypermetropic, because they are verily surprised when, through a lens, they see what the eyes of the other behold.

The conferences of physicist Matthew Kleban and chemist René Nome acknowledged this. In fact, to attend both lectures on the same day was a revelatory experience, one being the counterpoint of the other, and not only because of the explicit dichotomy between big and small – i.e., between the galaxy and the molecule – but also because both talks helped me realize that the issue of scale concerns size, certainly, but time as well, or rather, that the size of what one examines implies the size of the time being measured.

Kleban, the physicist, who sees things that are afar, spoke of billions of years; Nome, the chemist, who observes things close by, referred to nanoseconds. The zeros went back and forth, either billions of years of age and a billionth fraction of a single second. In a nutshell, what became clear was that time actually measures space, that it is the unit we have to diagnose bodies – a cell cannot be described in years, a star cannot be ascertained in days.

Kleban opened his talk with a fundamental question, "What is the difference between past and future?" He claimed that physicists doubt a discrepancy exists between the two instances. I think Luther, who believed in predestination, would agree with Kleban, but beyond that, what this shows is that time is a matter of space. And if we can go back in one, why shouldn't we be able do it in the other?

Kleban then discussed his specific field, cosmology, a science dedicated to writing the biographies of galaxies and stars, and which has determined the age of the universe to be 14 billion years. How?! I always wondered how someone could establish such a number, but Kleban answered my eternal question very clearly and very simply: by means of Hubble's Law. Hubble was the scientist who noticed that galaxies farthest from Earth were moving faster away from it, confirming that the universe is expanding. By calculating how fast they were moving away, he was able to determine when they had all been together. He called this moment "the beginning," if not of time, at least of the world, the genesis of everything.

Several others things were fascinating in his talk. For example, he described how the Milky Way seemed like a stroke in the sky because of the viewpoint from which we observe it. From our humble world, we see only the side of what is really an ellipse and misname it "Way." One more thing worthy of note – and I'm already leaving too much out – was the use of the first person in the lecture, something one does not often see in a scientist. Several times during his presentation, Kleban used the pronoun "I" to state his own views and opinion, that is to say, the viewpoint from which he observed history and the heavens, emphasizing his awareness of his position on the globe, even if his subject was everything that's outside it. Like Kepler, Kleban did not lose his own perspective, as in the following observation he made: "How can we count in years, that is, in number of revolutions around the sun, something that existed before the sun itself was there?"

René Nome, the chemist, in turn, also talked about extraordinary matters. His lecture focused on how to record motion inside the cells, movements that occur at unthinkable speeds. Nome showed the first picture ever taken of a galloping horse, which shocked the 19th century world because motion had heretofore never been stopped and, thus, no one had ever understood how galloping worked, a matter that implied profound anatomical questions. Everything that was thought about galloping horses went overboard after that picture; one has only to look at Gericault's painting from a couple of decades earlier.

Nome went on to explain how that process had continued, achieving ever greater precision in the capture of minuscule moments, helping us understand the motions of particles inside a cell. To accomplish this, it was necessary to distend time, that is, to create slow motion mechanisms capable of showing us what happens very, very quickly. From galloping horses to photosynthesis, this is the scope of

Nome's studies. His aim is to understand photosynthesis, the process by which plants capture sunlight for energy and that takes place at enormous speed – although I do not know if it is greater than that which separates the stars. Perhaps I should say I don't if they're comparable, because one seems slow (given the enormous distances) and the other seems fast (because it is very near).

Finally, one more comment: Nome displayed an absolutely amazing machine, a container with some sort of contraption that made it possible to whirl the liquid held inside. Nome proceeded to put three drops of colored ink, spin the device and mix the colors. He then spun the device in reverse and the colors were separated, becoming three drops of ink again. Contemplating our expressions of infinite distrust, Nome assured us that there was no film running backward; it was a chemical effect, an effect of extraordinary beauty that gave us the feeling, of course, of having turned back the clock, of going back in time.

He showed many more of these curiosities of science, which are its foundation. Every scientist is a spy, every scientist must be deeply suspicious, and that is why their search never ends.

Going back to the beginning, the curious thing about both lectures, about the relationship between them, was the dialogue between the diminutive and the humungous, questions of size that resulted in questions of time: each scientist seemed to use a fraction of time that was diametrically opposed, yet it was essentially one and same time – ours – of which we can only have a notion thanks to our traveling spaceship, our planet Earth. Kleban measures the universe in years, that is, how long Earth takes to travel around the Sun; Nome measures his particles in nanoseconds, which after all are nothing but fragments of a day-hour-minute- second-nanosecond, this is, of the time our beloved Earth takes to spin around itself. □

God, the brain and black holes - Exploring the conceptualisations of time in the realms of Philosophy, Biology and Astrophysics

by Victoria Rodner and Rosa Levandovski

http://ica.usp.br/docs/god-brain-black-holes

São Paulo, April 21, 2015

Day II (April, 21) of talks at Intercontinental Academia (ICA) and we are stimulated yet again by a variety of disciplines, scholars, and approaches to the issue of time. From religion to the origin of the universe, from the circadian rhythm to Realist and Relativist ontologies, attendees at ICA are invited to broaden their horizons as they dive head first into rich and diverse new fields of research.

We start the day with Professor Sami Pihlström from Helsinki Collegium for Advanced Studies in Finland, who presents the issue of Time from a Philosophical standpoint. A Professor of Practical Philosophy, Pihlström delves straight into the metaphysics of time and temporality, with his talk entitled Time & Eternity, where he considers whether time is an objective truth (and therefore 'real') or a socially constructed concept, as argued by Kant's transcendental idealism. Prof Pihlström leads us seamlessly through the philosophies of physics, history and religion and how these various approaches provide us with a variety of conceptualisations pertaining to Time. In his talk, he presents us not only with these varied conceptu-

alisations on Time, but also with the contested issue of 'eternity', asking the public whether or not this concept can even be considered (in philosophical or scientific terms) coherent. Ancient philosophers argued that the natural world around us was in fact eternal (although always in flux). However from a Judeo-Christian standpoint, we are given a much more linear framework of time, where there is a palpable beginning and an apocalyptic end to world as we know it. Despite this inevitable 'doom' promulgated by some organised religion, there is a belief of an eternal life after our time on earth. Beyond this dichotomy, Prof Pihlström highlights notions that appear eternal, for instance numbers and mathematical truths, propositions from philosophers, abstract entities, and perhaps even the concept of God as an omnipresent being. What I found most interesting of Prof Pihlström's talk was the notion of personal motivation and time. In his seminal essay of 1973, moral philosopher Bernard Williams noted how an eternal life would in fact become tedious (what he calls the 'tedium of immortality'), as the ability to do everything within a continuous 'lifetime' would in fact make us indistinguishable from others, who also had an eternal lifetime to achieve everything we had achieved, concluding therefore that an eternal life would in fact be demotivating. It would be interesting to consider this notion further and explore how various cultures (with different philosophical or religious underpinnings) differ in their motivation given their conceptualisation of time. This was a thoroughly interesting talk on the issue of time and brought up some very thought-provoking questions from the audience.

From philosophy we move swiftly into biology with a talk by Professor Carolina Escobarfrom the Universidad Nacional Autonoma de Mexico (UNAM). In her talk, Biological Time & the Dangers of a Disrupted Rhythm, Prof Escobar gives a compelling account of how our modern ways have in fact broken prevailing circadian biorhythms and are having detrimental effects on the human body and psyche. She asserts that, from a scientific standpoint, we are all in fact exposed to the effects of time and thus the concept is real and not socially construed. Although we are bound to a linear passing of time (from our birth to our death), our bodies rely on natural annual, monthly or daily cycles that are in constant repetition. However, modern man has ignored these natural cycles with the invention of clocks and unnatural light to break away from our day/night dependency and manipulate our conceptualisation of time. Prof Escobar's area of expertise revolves around the biological clock (or suprachiasmatic nucleus located in the hypothalamus of the brain) and her current research interest focuses on not only the exposure to natural and unnatural light, but also the effects of food on our circadian rhythm. Thanks to an alleged dominance over nature, humans are able to break these natural rhythms of night and day (having lights and entertainment at night, eating during the night, working nights, and so on) which is known as circadian dyssynchrony and gives the body the wrong signals. Prof Escobar advocates for circadian health in order to keep our biological clocks functioning, meaning that we should try to follow natural time cycles more closely to ensure physical and mental health. She gives a vivid example of her recent research at a neo-natal ICU where premature infants who had night / day cycles (versus constant exposure to light) showed significant weight gain and improved health compared to those who 'ignored' these circadian cycles. In her style and her content, Prof Escobar was able to capture the attention of any scholar in the room, scientist and social scientist alike, as her research is both coherent and thoroughly convincing to all.

After lunch, we are introduced to Professor Ruud Buijs, colleague of Prof Escobar at UNAM. Known to insiders as 'the brain man', Prof Buijs as a Neurobiologist goes into further detail on the biological clock and how it is crucial for the human body to function. Through empirical research, he demonstrates how the brain prepares the body for hormonal activity, including the intake of food. These stages of bodily activity can be altered if the food source shifts, as he shows in the example of Finnish bats tending to fly less at night in the winter months because of a lack of food source. Prof Buijs goes on to explain how seasonal shifts affect not only food sources and hence eating patterns, but also sexual activity in the animal kingdom. Closer to home, he argues that there is a clear link between sleep duration and obesity, so that a disturbance of the biological clock can even develop diseases such as Type 2 Diabetes and Obesity in humans. As these UNAM scholars presented their research over the two sessions, ICA attendees were presented with a stimulating and well-researched account of the issue of time from a biological point of view.

Worlds apart but equally stimulating, Professor Hideyo Kunieda from Nagoya University pre-

sents us with Time in Astronomy. As an astrophysicist, Prof Kunieda's talk centres round the role of physics in the understanding of time. In preparation for next year's event (March 2016), Prof Kunieda took the opportunity to briefly present Nagoya University and its areas of scholarly expertise to the public.

Dividing his talk into three distinct areas, Prof Kunieda covers the issues of a definition of time, the history of the universe (or cosmological time) and the theory of relativity. Hearing Prof Kunieda's talk made me regret my lack of knowledge in this particular field and wish I had taken the time to read my copy of Hawking's A Brief History of Time or at least some of Michio Kaku's work so as to better appreciate the vast subject matter of the talk. Nevertheless, Prof Kunieda gave a convincing presentation where he aimed to capture the enormity of his subject in a nutshell. His particular area of expertise lies in taking x-ray photographs of the universe to explain the cosmos and give us a better understanding of the concept of time. Guiding us through (not-so-simple) equations, charts, diagrams, and breath-taking photographs of stars and blackholes, Prof Kunieda concluded that time as a unit was determined by the earth's rotation and orbit, that the time axis is converted to depth of the universe, and that space and time are units of examination in the universe.

We have ended the day today, following a wonderful sunset with Professor Till Roenneberg, from the Institute of Medical Psychology, Ludwig-Maximilian-University, Munich, Germany (LMU), who brought together an interactive, philosophical, and biological talk into the field of Chronobiology. Once again we had to switch our minds to the field of the biological sciences. Sitting on a red stool, at the center of the auditorium, Prof Roenneberg started his talk with an experiment, where he invited us to close our eyes as he asked us some simple questions. Firstly, the audience was asked to point out where some things were located in the room, forcing us to use our memory if not our imagination. After a series of questions, the last one was related to the day before: where was the sunset? Being part of this didactic experience, made us think more carefully of time and space. The assumption behind it (the fact that most of our answers were right) was not thanks to our memory, but in fact because our brain provides us with a model related to space and time.

After this introductory experiment, Prof Roenneberg became more provocative; setting the idea that the circadian clock does not in fact resemble an actual clock at all. To explain this, he went into some detail on Darwin's theory of biological evolution of the species, giving us some vivid examples. At that time we had to switch on again, to philosophical concepts of evolution, stating that all organisms arise and develop through the natural selection of small variations allowing the individual's ability to survive. What we know as the circadian clock is therefore not really a clock, but can be used as a clock as it works as a model that allows the representation of time and space for organisms.Biological rhythm works as the rest of the universe does, as an example of the laws of physics anticipating or predicting what will happen next. The concepts ofentrainment give us the evidence that the Suprachiasmatic Nucleus (SCN), in animals and humans, can be adjusted by the light-dark cycle. Although the blind are physically unable to distinguish these cycles, they can be synchronized using melatonin, the hormone responsible for entrainment, which takes place in the SCN. Moving to the contemporary period, Prof Roenneberg stated that our industrialized civilizations are now suffering from a phenomenon known as a Social Jet Lag, where the circadian clock has difficulty with entrainment. As the internal circadian system is organized by the Sun's clock (not by the social clock) the reality we face today is that up to 85% of the industrialized civilization relies on the alarm clock to wake up in the morning, meaning that the majority of the population is forced to wake up before their internal circadian clock is ready to do so, thereby breaking the natural rhythm of the human body. Social Jet Lag can be measured by the discrepancy between internal biological times, work time, to the external social times and leisure time. Throughout the talk, the young researchers had the opportunity to discuss their ideas with Prof Roenneberg in what an very stimulating and dynamic presentation.

Today's talks were peppered with brief presentations from the young researchers who have been invited to the conference to share their research interests with fellow academics. Also a group meeting was arranged between the young researchers, critical rapporteurs and audio-visual rapporteurs to discuss ways of disseminating the work of each participant (via videos posted online) and how to make the most of the ICA event as a platform for research. □

‘There is nothing new under the sun’
by Victoria Rodner

http://ica.usp.br/docs/nothing-new-under-the-sun

São Paulo, April, 22, 2015

Day III (April, 22) and we all become ethnographers. Professor Emeritus of the Goethe University Frankfurt, Karl Heinz Kohl brings our attention to the issue of time from an anthropological standpoint. Unlike the applied sciences, anthropology offers no single definition for ‘time’, making this a truly multifarious concept. Nevertheless, given the framework of an hour-long talk, Prof Kohl wishes to provide at least some selective concepts of time for the audience. First of all, he assures us that as a socially constructed notion, how people experience time is necessarily culturally embedded. This conceptualisation of time may well vary within neighbouring societies, if the modes of labour differ significantly.

He presents us with an iconic image of Charlie Chaplin’s film-still from Modern Times of 1936, where the ‘comic’ social commentator shows how man has become a slave to modernity because of continuous labour patterns and perpetual notions of time. In the field of anthropology (and beyond) time was considered for many years as progressive and linear. With the invention of the pocket watch and the train, mankind became obsessed with keeping time, making time, saving time, measuring time, beating time, investing time and never wasting time. It is safe to say that with the Industrial revolution and zealous modernisation, man’s concept of time broke away from the natural cycles that had dominated for centuries if not millennia.

Time, and the manipulation of it, went hand in hand with the idea of progress. Those who were seen to be unable to ‘keep up with the times’, were dismissed as uncivilised, backward, savage. However, there soon came some reconceptualisations regarding the issue of time and a call for relativism in this field. As anthropologists became more interested and sympathetic to the study of ‘other’ cultures, they soon noted how time could be cyclical, especially in agrarian communities. This realisation seemed to highlight the rigidity of the Western concept of time as linear and compartmentalised, calling into question its validity and perhaps even benefits for modern man. Prof Kohl stresses how ancient mythologies from across the globe have portrayed time as cyclical rather than linear, so that the present is in fact a repetition of the past.

Linking his talk to previous ones, Prof Kohl notes how Hinduism and Buddhism extend this cyclical notion of time to the origin of the universe, so that if an eventual ‘Big Crunch’ follows on from a ‘Big Bang’, this would in fact be a renewal the cosmos, not the end of it. He also brings our attention to the modern mythologies of the Aborigines in Australia, whose Dream Time centres round realities in parallel universes, which are repeated in our earthly world in a cyclical manner. Prof Kohl concludes his talk with a well-known quote from King Solomon - ‘There is nothing new under sun’ – thereby implying a cyclical quality to the issue of time. This notion of perpetual repetition or cyclical nature of time seems to offer a more bearable existence for mankind in both the short and long term. His talk ignited a variety of questions from scholars across the fields, making this a truly stimulating and interdisciplinary approach to time. □

The Future of Academia – reconsidering the role of universities

By Victoria Rodner

http://ica.usp.br/docs/the-future-of-academia

São Paulo, April, 20, 24 & 27, 2015

Intercontinental Academia (ICA) not only presented itself as a gathering of young and senior academics to present their own approaches to the issue of time. At the heart of this event we find a deep contemplation on the future of universities as centres for research and training. From the opening ceremony to an exclusive lunch with the University of São Paulo's Rector Professor Marco Antonio Zago, we note how the future of higher education remains a key concern for teaching staff, directors of institutions, the Ministry of Education, and, naturally, students.

During the delectable lunch hosted at the new rectory building overlooking São Paulo's immense skyline, Professor Till Roenneberg points out that our concern lies not merely in the 'future of universities' (as physical structures and platforms for scholarship) but in the 'future of academia'. This subtle change helps expand our dialogue on the subject and think beyond the bricks and mortar of the university as a physical structure and to consider how we approach research and teaching in more general terms. In a vivid panel discussion, 6 university presidents from Brazil and the UK discuss the challenges that universities face today and will face in the future. From digital education to globalisation, from peer to peer learning and the obsolescence of the university professor, this panel presented a variety of issues currently affecting the university as a space for research and education. It was particularly interesting to tap into the actual workings of the university system and how to reconsider the mission and vision of these institutions so that they meet the demands of the future. Compressed into 10-minute talks, each panel member took the opportunity to share their approach to higher education and how they envision it for the future. At the end of this discussion, we are left with the thought that universities as education vessels must adapt to their environments and can no longer behave like metaphorical 'ivory towers' that are idyllically distanced and untouched from wider macro-level forces. In order to survive and respond to the macro-environmental demands of the future, universities must adapt their teaching, research and outreach programmes to ensure their sustainability and relevance in society.

Focusing on the case of USP, former Rector of the university and former Minister of Education, Professor Jose Goldemberg argues that universities must have social relevance and encourage knowledge transfer as a way of bridging research to wider fields. Specifically, he argues that institutions of higher education should focus on influencing policy through their research. In his talk, he presents a critical review of the university and uses informative data taken from the 80th anniversary report that he published in 2014. Considering that the university is fully funded by the State of São Paulo, he believes that it is crucial that the institution is able to justify its existence, which means proving its relevancy well beyond the realms of academia. He applauds the efforts of certain departments within USP that have made noteworthy contributions to technology, science, or society (naming the Faculty of Agriculture and its advances in alternative forms of fuel for instance). Prof Goldemberg is also keen to measure USP against other universities worldwide. Although the university is highly ranked (considering the dominance of US and UK research-led institutions in ranking tables), Prof Goldemberg feels that USP still has a long way to go to have a stronger impact on a global scale. One way of increasing their academic impact inevitably lies in more accessible research output by publishing in international journals. He provides us with evidence regarding this move towards English publications, which necessarily translates into a decrease of publications in Portuguese. Another key ingredient to achieving this high impact is to continue to encourage interdisciplinary work with events such as Intercontinental Academia and departments such as the Institute of Advanced Studies. In his distinctive succinct yet eloquent manner, Professor Till Roenneberg echoes these thoughts during the Q&A. He argues that research of the future does not lie in individual but rather in collaborative thinking. However, in order to work effectively in teams, individual researchers must first and foremost become experts in their field so that they are 'unique' in what they do. Strongly advocating for interdisciplinary research, Prof Roenneberg argues that this need not imply that researchers become 'the jack of all trades' (and hence master

of none) but rather that they are prepared to combine their knowledge with colleagues in departments well beyond their comfort zone. This cross-disciplinary approach will lead to much 'bigger questions' being made, which in turn will encourage marvellously innovative and high impact factor publications.

Expanding this notion of interdisciplinary research and the multi-faceted scholar of the future, Prof Zago at USP and the newly appointed Minister of Education Renato Janine Ribeiro seem to long for a more holistic approach to education where students' learning encompasses a wider field of disciplines so as to better prepare them for the world of tomorrow. This seems to hark back to a previous scholarly approach when the social elite was educated in a much broader field of study - including the applied sciences, humanities, and the arts - in an attempt to better understand the world around them and become well-rounded intellectuals. However, over the centuries and in particular as a consequence of the Industrial Revolution, public education has witness 2 distinct changes: firstly, an expansion of education for the masses, and secondly a professionalization of the market economy. During the 19th and 20th century the world saw a mushrooming of universities across the globe, making education (and even higher education) more accessible to the people. This accessibility came hand in hand with an academic specialisation, where departments, schools and faculties trained and prepared the workforce of the future. As a natural consequence of this increased specialisation, these faculties, schools and departments grew more and more distant from one another, so a cross-disciplinary dialogue became increasingly difficult if not meaningless for research output. Events such as ICA and the expansion of Institutes of Advanced Studies across the globe respond directly to this need to dialogue with other fields as a means of expanding our own knowledge.

It is clear that the event hosted at USP's Institute of Advanced Studies in April 2015 was warmly welcomed by both scholars and managerial staff alike. During his workshop, Minister Renato Janine Ribeiro congratulated the immersive nature of ICA and noted the productivity of the event overall. As both a political figure and a philosopher (PhD, University of São Paulo) he feels strongly about the role that universities play in shaping a country. He presents us with some striking figures: in 1968 Brazil had around 100,000 students attending university, whereas today over 22% of the population graduates from university, be it from a State, Federal or Private Higher Education institution. For a nation such as Brazil, with its undeniable socio-economic challenges, this increase of university attendance means that higher education no longer lies in the hands of the elite. Nevertheless, Brazil still has a long way to go and the Ministry of Education would like to see a much broader expansion of the university attendance. Minister Ribeiro gives a vivid example of why education does not always capture the attention of the people. Unlike health, a poor education is hard to pinpoint, where those that suffer from a poor education remain unaware of their academic 'disability' and the detrimental consequences a lack of education will have on their future. Minister Ribeiro attests that education lies at the heart of the social inclusionist approach of the Partido dos Trabalhadores (PT), which aims to expand the nation's middle class and eradicate extreme levels of poverty in the country. Historically, power discourses imposed by the State or heads of the Church may have encouraged social inequality and an acceptance of one's marginalised social and academic status. Today, however, the government and the market economy have the tools to pull people

out of poverty and shift the mind-set of those most in need. Much like access to water, electricity or the internet, Minister Ribeiro believes that access to higher education should be universal, suggesting that if '50% of the population goes to university, this would be a good thing'. This increase in university attendance seems to echo recent UNESCO estimates that foresee that over the next 30 years more people will be graduating from university worldwide since the beginning of history. Despite these positive projections and an expansion of higher education across the globe, some education scholars have noted a lamentable devaluation of the university degree, so that in some societies a university degree is no longer sufficient, and students are forced to pursue post-graduate degrees or even doctoral degrees just to ensure employment, meaning that some parts of the world are witnessing a Higher Education inflation so to speak. Be that as it may, Minister Ribeiro is certain that widespread university education is the key to success and his concern centres round the social equality and sustainability of the Brazilian education system as a whole. He ensures that Brazil – unlike some other markets – is ready to accommodate this growing number of university graduates and that the local economy needs more trained professionals as the country continues to grow and develop. To conclude his talk, he suggests that higher education need not be so deterministic in our future and employment prospects, a stigma that unfortunately continues to haunt Brazilian graduates today: architecture graduates must work as architects, linguists must work with languages, economists must work in finance, and so on. Instead, he calls for a broadening of the academic experience and encourages a multidisciplinary approach to learning, whereby future graduates will be more prepared and flexible to face the ever-changing world that lies ahead of them. □

2025: The Entire Surface of the Earth Is Occupied

Comments on Vera Lúcia Imperatriz-Fonseca's lecture, Biodiversity and Global Policies

by Julia Buenaventura

http://ica.usp.br/docs/surface-earth

São Paulo, April, 25, 2015

In Las maravillhas del año 2000 [The wonders of the year 2000], a book by Emilio Salgari, an older scientist convinces a young millionaire, bored with his own fortune, to travel to the future. They take a pill that, in 1903, will keep them frozen for a hundred years, so they can wake up in 2003 and contemplate the wonders of the new century. Salgari, who is a kind of Italian Jules Verne, dramatic and long-suffering, presents us a string of incredible inventions, all arising from electricity, in a somewhat chaotic world where, nevertheless, humanity remains more or less the same: we have a bureaucracy, dissidents are still rounded-up and there is a very bitter struggle against nature – which, in Salgari's future, has not yet been defeated (extinct). What is most striking

in the book, however, is the "premature" death of the two main characters, the scientist and the young millionaire, whose bodies cannot withstand the high electric voltage of the current world and succumb after some instances of madness.

Written in 1907, the novel does not even contemplate the possibility of a communist revolution, or rather, it tells there had been one, but that the project fell apart and only a few communities remained trying to grow their own food and develop group projects without resorting to capital. Salgari was a genius and his vision of the future reveals a lot about our own present: first, the ingrained and arduous struggle against nature on which our contemporary world is based, with its modern framework of production and accumulation; second, the pollution and contamination that overproduction generated in its attempt to save time (and it is amazing how clearly Salgari foresees, or guesses, or suspects this).

The conference by Vera Lúcia Imperatriz-Fonseca, professor of the Ecology Department at the Biosciences Institute of the University of São Paulo, revolved around this issue, the overexploitation of the world that has been going on for over fifty years, to such an extent that, as she put it, 2025 will see the entire surface of the planet occupied, taken over, invaded. In other words, Earth will not have even one square centimeter free from human presence and, above all, free from a mode of exploitation that leads to the annihilation of resources – that is not sustainable, in other words.

In this context, one of the fundamental questions professor Vera Lúcia raised was what can we do to preserve certain areas, how can we close off some regions to unbridled production. In short, how can we preserve and protect that which remains? To elaborate this issue, Vera Lúcia explained various agreements and protocols that have been established globally since the 1972 Brundtland Report of the World Commission on Environment and Development, the Rio agreements, the Millennium Ecosystem Assessment (MS), the Intergovernmental Panel on Climate Change (IPCC) and the Sustainable Development Goals adopted by the UN at the end of last year.

Finally, Vera Lúcia focused on the Intergovernmental Platform on Biodiversity and Ecosystem Services (EPBES), whose aim, as the name implies, is to preserve biodiversity, which faces serious threats because of its frailness and of the long time periods involved. EPBES is a project in which Vera Lúcia participates directly. (By the way, she has studied pollination systems in depth – the work that insects carry out discreetly, so to speak, but underpins the very survival of plants, the basis for all living beings.)

In this context, one of the most interesting points of her approach was the argument that, to address local problems, the solution must be local. This sounds simple but it is not, because one of the great contradictions of modernity and its modes of production is to provide general answers to specific questions, i.e., to solve specific issues with external solutions that quite often deteriorate or destroy the habitat one sought to help. To state that local problems need local solutions is, in my view, a paradigm shift, opening up the possibility that institutions or universities will listen to the people, to their specific problems, before proposing solutions – or, better yet, allowing solutions to emerge from the communities themselves.

Likewise, this point connects to another one expounded by Vera Lúcia, namely, that food is also a local issue, a position that calls into question a mode of production (monoculture, pesticides, fertilizers) that is literally wasting away the planet. Vera Lúcia also stressed that, in order to achieve actual changes in themodus operandi of the system, it is necessary (and urgent) that academics leave their own circle and join fields of action that are often in the realm of politics.

She later dedicated some time to discussing specific issues regarding the workings of this platform. For instance, how to select scholars interested in participating in the project and how to lay out schedules and activities.

One final point. In Salgari's book, the world does not face many environmental problems. Animals have not been extinguished, a fact the characters actually see as a sign of defeat, as something negative. People are still engaged in farming, because they have been able to solve the food problem with electricity, even if machines are responsible for everything else. In Salgari's world, there are no large food-producing corporations. Perhaps that is why it is humans (the

young and the scientists) who die by means of their own inventions, even if they are still far cry from taking all life on Earth with them. In fact, in the novel, people continue to defend themselves and to annihilate – or, at least, corral – wild animals, which they have failed to fully master. This notion tells us that, far from being a flaw in the plan, our current situation, our destruction of the natural habitat, is, quite the opposite, a key part of the project.

The project was to have the entire world dominated, "cleansed," occupied and populated. Occupied! This will happen, as Vera Lúcia indicated, in 2025. In short, what I'm trying to say is that disaster is part and parcel of the script we are following – unlimited production, progress and economic growth –, not a contingency of the modern project that, owing to a series of mistakes, came to this.

Thus, I think we must all fight for these projects that want to save biodiversity and preserve what remains. But I also think it is absolutely necessary to change the modern foundation of their approach. Talking about "sustainable economic development goals" (like the UN does) is a contradiction in terms; the modern economy has no alternative but to keep accelerating and growing, because growth is its essence, because capital will collapse if it does not grow.

Actually, we need the collapse of the economy, not these crises that merely bombard it. In other words, we must stop – not produce more of what we already produce, not accumulate, not progress. On the contrary, we must slow down, distribute and rest: stop the car, get off the locomotive and let go of the illusion that we are saving the only thing that cannot be saved: time. There is no wealth, no agenda, no nothing that can capture time. Yet time is precisely what the modern project wishes to conquer and save. Seeing it cannot, it attempts to destroy everything that exists. □

Kairos encounters Chronos. The ubiquity of ethnography for achieving spacetimes in digital cultures

by Gonzalo Iparraguirre

http://ica.usp.br/docs/kairos-chronos

São Paulo, April, 27, 2015

The last talk of the first phase of the Intercontinental Academia was special to reflect about the multiplicity of topics that were treated in the previous expositions and, as Jorge Luis Borges says, the "ubiquitous problem of time". An appassionato Italian anthropologist, Massimo Canevacci brought to us a strong dissertation entitled "The ethnographic experiences of digital cultures and the syncretic mix of spacetimes".

'Ubiquitimes' was introduced as a core concept of an anthropological methodology to understand the transformation that digital cultures are making with respect to the linear notion of space-time. Internet's space-time can be conceived nowadays as the emergence of ubiquit times and spaces, interconnected in multiple levels of imagination, meanings and experiences.

In convergence with the mythological metaphors remarked in many previous talks, Canevacci mentioned that besides Chronos, Greek people had another divinity for time called Kairos, referred to the displacement of events, an indeterminate and spontaneous time. In dissonance with the metric, rationalist and linear time that Chronos manifests, Kairos expresses a substantial mode to apprehend the virtual and digital syncretism that characterizes contemporary life.

Ubiquitimes are composed by three central concepts or statements: simultaneity, chronotope and ubiquity. In the first one, the synchronic link between subjectivity, aesthetic and political ideas is condensed; all of them come together and conform the landscape where it is possible to experience simultaneity. The second one expresses the unification of space and time in a narrative proposed by Mikail Bachtin, who pointed out the end of the monological projection of the author by decentering this in the construction of the narrative. Gregory Bateson and Margaret Mead are examples of this methodological implementation in anthropology writings. The last one is rooted in the traditional idea of the panoptic view of God in Christian religion, the mystically idea that everything could be seen, known and judged in every place at any moment.

Applied to digital cultures, ubiquity embodies the relation that people have with digital technology and Internet, mixing logical and sensorial experiences in many senses. This allows to capture the connection between the

material and the inmaterial, to go beyond the dualistic form of thinking. Ubiquity refers, Canevacci emphasized, to the potential imagination connected to the rising of techno-digital.

As an example, he presented a street manifestation in Barcelona, virtually practiced through holograms to protest against a public policy without affecting the transit. This ubiquitous way of manifesting social changes creates a new manner to do politics, based on digital supports and in the multiple individualities or multividual identities. Another example mentioned to compare the enormous distance between the notion of time in industrialization and the ubiquitimes was the excellent movie series "Black Mirror", the contents of which predict the near future of techno-virtual society, anticipating in many things the scientific analysis of prospective social and global scenarios.

In the same direction, Bottega digitale (with no direct translation to English), a kind of digital source where it is possible to experience art, exemplified the richness of connecting art with science, taking a renascent concept of a creative solid environment to comprehend digital and virtual cultures. Also, concerning the mutation in space ideas, he compared "utopia", which means no place, with "ubiquity", which means all places. Taking the works of architect Zaha Hadid, who materializes ubiquity through design and style of her architecture, an innovative way to spatially express the symptoms of societiesit was shown to us.

The Italian anthropologist proposes to think about the social mutations that globalization is making to emerge in every nook of the globe. He showed us an ethnographic example of his fieldwork with Bororo people in the Amazonas – the same village where Lévi-Strauss stayed in 1935 - who are creating their own films with digital video cameras and use Facebook as any other society with Internet connection. In another opportunity, surprised that his Xavante informant was filming at him, he asked to himself "Who is the anthropologist? Who has the right to represent a different culture?" The answer, confessed Cannevaci, take us to the problem of the self-representation.

Through all these ethnographic cases, it has been demonstrated how experiences of ubiquitous notions of time in different cultures and persons are auto-generated. Precisely, when introducing Karl Heinz Kohl's talk "Concepts of time across the cultures: an anthropological view presentation", Canevacci mentioned that ethnography is not an exclusive tool for anthropology anymore and emphasized that nowadays it belongs to the humanities as a whole field of human concerns, which includes art and science of course.

Through a cross-language performance between English, Portuguese and Italian, he showed the deployment of the force that multiculturalism has to offer for the challenge of conceiving an intercontinental approach of art and science – as Jacopo de Barbari's painting "Portrait of Luca Pacioli", Nele Azevedo's temporary art "Minimum Monument", György Ligeti's "Poem Symphony" or the Bororo's video of self-representation remind us. □

Science as academic mythology: Metaphors that bridges time and temporalities

by Gonzalo Iparraguirre

http://ica.usp.br/docs/science-mythology

São Paulo, April, 28, 2015

Science and myth are two words that have emerged several times during the first week of work at the ICA in São Paulo. Fifteen talks with different senior researchers, from different Universities and countries, have spread out a huge range of fields of knowledge and gave the initial stimulus to the discussion sessions of the thirteen participants.

From the first talk, Matt Kleban's Cosmic History and Time's Arrow, we have learned how astrophysics has conceived the cosmological history of the universe based on different theories of the Big Bang, discussing where the "beginning" of time was and the arrow's model implications with graphs. These images have reminded how metaphors are so important in mythology as in science. From anthropology, the "cosmology" of any culture is based on their world views, the ideas and imaginaries that define their notion of existence and sense in life. Talks about origin and destiny are, punctually, structural aspects of cosmogony myths. Myths talk about origins and destinies, birth and death, past and present. So why does science have a unique field of research called "cosmology" that is responsible to address this kind of topic? And why is cosmology supposed to be "the truth" and the ultimate word about the beginning and the destiny of our society? Is it possible to conceive scientific cosmology as a contemporary academic mythology?

If we look at the theory of the Big Bang, for instance, it consummates the basic elements of a myth. This cosmological theory has mythical images like the "bang", an initial explosion or ignition that begins everything, the idea of a beginning of the Universe or a world, marked in a distant non-human place (the theory assigns this moment to 14.3 million years ago). These are typical elements of the origin of the universe in several mythologies. Cosmology conceived as a discourse, as a narrative, is constructed based on creation metaphors. The digital and animated graphs, usually used to explain this theory, are for scientist like sacred symbols that summarize the whole theory, as ancient civilizations had for explaining their cosmogonies (cylinders in Sumer, papyrus in Egypt, statues in Rome, mandalas in India, pyramids in Maya societies, body tattoos and textile design in aboriginal societies, just to mention a few).

Eliezer Rabinovici's talk, Constructing Time In Physics- Attempts, has shown us how physicists have been attempting to understand the experience of a time and its flow, comparing studies of large and small time scales. In his presentation, he showed biblical texts and mythical images, like the Goya's painting of the Greek myth of Chrono eating his son. Cosmogonic metaphors are usually used in physics to deal with the cosmological problems. A well-known metaphor, "God doesn't play dices with the world", was used by Einstein to respond the question whether reality is deterministic or stochastic. Scientific and mythically rooted metaphors allow us to understand binary contradictions and go beyond a dichotomous rationality. Scientific theories coming from different fields incorporate external and intangible characters in their models like if they were heroes or gods, a central element in the architecture of myths all around the world. The "gravity", the "light", the "space" and of course the "time", are treated as Tlaloc,

Viracocha, Thot, Baitogogo or other mythical heroes that sometimes represent these cosmic forces and sometimes are the vehicles of them.

Laymert Garcia Dos Santos's talk about Myth and Technoscience in Transcultural Amazonas has presented another interesting example to think mythology and science, connecting shamanism to techno-scientific culture. In this experiment, called the Opera Amazonas: Music Theatre in Three Parts, Dos Santos has made an artistic bridge between two worlds, the magic one and the digital one. Dos Santos explained two ideas of virtuality, the visions and hallucinations of the shamans in trance (internal, non-material and intangible embodiment), and the visions of the producers of the Opera, who have created an artistic performance of the inaccessible world of shamans (external, material and tangible embodiment).

Dos Santos has told that shamans got angry when they saw a projection in the forest, because the filmed rituals have been edited by the producers to fit in a conventional movie format (they filmed for more than 10 hours and showed them just one). For the producers, formed in the scientific-hegemonic temporality, it is clearly natural to edit moments to create a narrative. This notion is rooted in the idea of accumulation of processes, sequential and linearity events. On the contrary, for the originary temporality of yanomami people – as many other non-hegemonic temporalities –, events of life cannot be edited. The selective representation is not a logical possibility, it mutilates reality, so only presentation (present attention) and complete events make sense to them.

Another excellent exposition was given by Leopold Nosek, who talked aboutTime and subjectivy,connecting the myth with birth. Based on Freud's psychology, Nosek proposed that "birth" is in direct connection with the conscience of the self, and exemplified that the memory is happening now, not in the past. The passage from the myth (atemporal) to the birth is a beginning, a start of conscience of self. Looking forward how we apprehend time, Nosek read some literature examples of Thomas Mann, who invocates the passage from atemporality to the awareness of time; a process that could be understood as the passage from a myth-logic to science-logic.

The Intercontinental Academia invites us to reflect on our scientific praxis, to rethink our deep conventions, and to contemplate that metaphors, symbols and myths are basic elements in the construction of identities and paradigms. Academic metaphors of time create the bridge among different scientific temporalities. With a specific language and based on its certainties, contemporary science provides protection to the mystery of the existence and time, as mythology did and some cultures still continue to do. □

Reflections on Time – 13 Young Researchers take on a multidisciplinary approach and prepare for the future

By Victoria Rodner

http://ica.usp.br/docs/reflections-on-time

São Paulo, April, 29, 2015

The theme at this year's Intercontinental Academia (ICA) has centred round the issue of Time. From astrophysics to chronobiology, from philosophy to anthropology, guest speakers have expanded on this issue in their varied disciplines exploring how time plays a pivotal role in shaping the world around us, and consequently shaping our understanding of it. Cyclical or linear, measurable or incalculable, vast or microscopic, eternal or finite, relativist or absolute, time as a concept (or a reality) affects us all.

Scholars from every field, be it the humanities or applied sciences, inadvertently approach the concept of time in their own research. What we witness at a multidisciplinary event such as ICA, thanks to the broadness of the chosen theme, is that every talk brought an interesting new perspective to the table, which allowed fellow academics to participate in a free and welcoming dialogue on the issue of time. Despite the increased specialisation (if not

narrowing) of academia today, ICA proves that there can be events when multiple disciplines come together in a healthy and stimulating scholarly amalgam. Breaking out of each of our research moulds, tightly categorised and highly specific, ICA provides a platform of interdisciplinary study where each talk can spark new conceptualisations and even shed some light on our own approach to the issue of time.

Alongside the presentations by professors from across the globe, thirteen early career academics were invited to attend the event and during the second week of the conference reflect more carefully on the issues that

had been covered. As their field of interest revolves round the issue of time, these young researchers could couple their own research with the work presented by the senior academics, thereby broadening their field of inquiry and approach to the subject. The outcome of these reflections was presented at the end of ICA in the Closing Report and will be revisited in full at the next edition of Intercontinental Academia hosted at Nagoya University (Japan) in 2016.

In their closing report, the young scholars presented a very cohesive, informative and ambitious proposal of what we can expect to see at next year's event in Japan. They kick off the talk with a very warm and sincere thank you to ICA's organisers. They are grateful for the hospitality of USP's Institute of Advanced Studies (IEA) and for the tireless efforts of the IEA team throughout the 2-week period, for the inspiring presentations from the invited guest speakers, and for the kind invitation from Nagoya University delegates to next year's event. They also offer a special thank you to Professor Martin Grossmann and Professor Regina Markus for their time and dedication to make this event possible. Overall, the young delegates enjoyed the incredibly enriching sociable nature of the event itself. The immersive quality of this year's edition of ICA has allowed these young researchers to bond with one another beyond any of their expectations. Placed under the same roof and exposed to such an invigorating programme has encouraged these young delegates to share their scholarly interests with one another but also develop strong friendships that will be sure to outlast this (and even next) year's event.

The purpose of this closing report is to present an outline of what the young scholars hope to achieve for the next ICA in Japan. The main outcome of their collaborative work - that will continue over the next year until March 2016 - will be an interactive online guide for students and researchers who wish to develop or extend an interest in the concept of time. On this platform, the young researchers will present lecture-like films covering a wide variety of topics that they have carefully devised on the issue of time. However, they want this platform to be as interactive as possible, so that viewers can post their questions, their comments or feedback, upload their own research onto the site, and naturally download papers and interesting material as a way of expanding the on-going dialogue on time. Geared at a wide audience, this online portal will be very multidisciplinary and will surely have something for anyone interested in the concept of time. In order to make their video lectures more visually stimulating, the young researchers propose to use an animated video programme (such as the RSA Animate series, for instance), which will allow them to design and illustrate their ideas as they speak, thereby helping them get their message across in a clear and innovative manner to the digital viewer.

Given the enormity of the subject matter, the young researchers have envisioned 4 foundation themes that should encapsulate all the areas to be covered on this online platform. They present these themes under the headings of: What is time? How is time perceived? How is time conceptualised? and lastly How is time used? Within these broad questions, they have also developed 13 key categories that will be presented by individual members on the online platform and at next year's event, including: how time is measured; whether or not time is relative; the traces that time leaves behind; what symbolic representations of time mean to us; whether non-humans also have a sense of individual time; how time is valued; can the future be predicted and is time 'running out'; does time have a history and why the present is so spe-

cial to us; the temporal illusions of time; the relationship between time and causality; how rhythms interact; and lastly how our conceptualisation of time may change in the future. It is clear that careful thought has been invested in developing these themes over the last few days of the event. After a week-long conference packed with enriching talks on the issue of time, the young researchers have made excellent use of their own 'free time' to discuss their project and bring it to life in just a few short days. Working across a variety of disciplines has its obvious challenges, where ontological standpoints, methodological approaches, technical language and even research outcomes differ immensely across scholarly fields. Overcoming these challenges is what cross-disciplinary research is all about and it is clear from this final presentation that these young researchers have made a point to cross over into one another's field of study and expand their own understanding of the concept of time. Extending this multidisciplinary dialogue to a wider audience is the purpose of the online platform and the goal of the young researchers over the coming months.

To conclude their presentation, the young scholars present us with a 'wish list' of possible professors that could be invited to speak at next year's event. Although the young researchers thoroughly enjoyed listening to the research by the senior academics that presented at this year's event, and appreciate the range of disciplines that together they covered, they would ideally like to hear more on the issue of time from economists, philosophers, historians, ecologists, art historians, and/or linguists so as to cover an even wider range of fields that they felt were missing at this year's gathering. To wrap up this closing report and ICA 2015, we are presented with a warm welcome video from Professor Nori Shinohara, Director of the Institute of Advanced Research at Nagoya University, inviting the young and senior researchers to the 2016 edition of ICA.

So this brings us to the end of ICA's 2015 event hosted by the University of São Paulo's IEA. All participants are both physically exhausted and mentally drained. However, they are in equal measure academically stimulated and driven to do more. They leave the bustling city of São Paulo motivated to expand their research into brand new territories and feel emotionally fulfilled by the success (both social and scholarly) of the event itself. This two-week gathering gave participants not merely a taste of Brazil, but more importantly a taste for better and more exciting things to come in the field of cross-disciplinary research. Presented as a platform for exploring the issue of time, participants leave ICA with much more than some interesting notes on their laptops and natty business cards in their wallets. They leave with a sense of purpose and a vision of the future. Time will tell if this cross-disciplinary enthusiasm will spread to even more fields of study and institutes of advanced research across the globe, and how these gatherings will directly affect each researcher's own Institute of Advanced Studies back home. For now, the participants pack their bags and prepare themselves for next year's event where young and senior researchers will share once again their thoughts on the issue of time. Japan in springtime is simply the 'cherry on top' that they are all looking forward to already. □

Quantify & Select: A Critical and Panoramic Report on the Intercontinental Academia Seminar

by Julia Buenaventura

http://ica.usp.br/docs/quantify-select

In this first of two modules, the Intercontinental Academia was in fact a 13-day seminar that comprised two collective conferences, seventeen individual conferences and one roundtable, in addition to six open discussion encounters. The conferences dealt with two major themes: on one hand, time, which was the main axis of the seminar and was addressed from the viewpoints of physics, biology and anthropology, among other areas; on the other, the university as an institution.

The participants, in turn, comprised several groups: first, the lecturers, most of whom were over 40, held doctorates and had a long history of research; second, the young scholars, a group of thirtyish university professors with ongoing doctorates and study projects; third, a group of four reporters in charge of drafting critical essays about the event (I among them); finally, a group of four visual reporters.

Overall, as I saw it, the lectures – some more, some less – adhered to a common denominator: the quantification of the world, or of the objects of study, and the use of statistics as a key tool in various disciplines. Thus, the history of the universe itself became a matter of measurements, of knowing its age in years, of quantifying galaxies. Physicists, chemists and biologists exposed their knowledge through numbers, or more specifically through means and averages: how many hours one sleeps, how many mice displayed such behavior, and so on. Similarly, those who spoke about education or the university as an institution also resorted to numbers, in the form of ratios and comparisons, to present an overview of the various academic bodies and of the society with which they interact – e.g., how many illiterates, how many graduates, how many papers etc.

"How many" was a major component in the lectures of the guest professors, confirming a current trend towards knowledge that can be conveyed through numbers – which always seem like goals and are, therefore, unquestionable. That is to say, the lectures – many of them profoundly valuable – revealed a perceptible interest in passing on knowledge by means of numbers, to which today's academy seems unwaveringly dedicated.

So I will also use this very same tool to expose some aspects of the group of scholars that discussed time, the young researchers. As I noted, these were thirteen professors from leading universities, who age hovered around 30, having been born between 1974 and 1984. Four of them were from Brazil, three from Germany, two from Japan, one from England, one from the United States, one from China and, finally, one from Finland.

The branches of knowledge, in turn, were somewhat particular, with seven researchers associated with biology, neurology or the behavioral sciences (that systematically observe the behavior of people or animals), four dedicated to the history of art or literature, one historian and one mathematician. Finally, it is worth noting that the group consisted of eleven men and two women.

I'd like to make two observations with regard to this state of affairs. Firstly, the group was a heterogeneous assemblage that enabled conversations and discussions from dissimilar points of view: we learned how a historian, a biologist or a mathematician understands the passage of time, or what temporality might mean for some-

one who works with aesthetic objects or with biological bodies. In short, the seminar was open to many possibilities. And, indeed, there were some interesting discussions, specifically one about whether time is way of learning about the tangible world or a property of the world itself – leading inevitably to the old and fascinating dispute over the existence of time.

This opportunity to establish an interdisciplinary discussion was fantastic, and truly urgent in an increasingly specialized academic world, where specialization has almost upended the project of "university" itself – a word that shares its etymology with "universe" and "universal", i.e., that which although being many still remains one. In sum, taken to the extreme, specialization has blocked the possibility of non-reductive knowledge, of knowledge capable of embracing the whole world. This no longer implies a union of scholars, but rather that each one, seeing things from their perspective, attempts to understand the whole. Or as Tolstoy said, it is by describing your village that you will describe the world. The Intercontinental Academia was a clear attempt to redeem the basic project of a university that, although divided, is capable of containing the universe in each of its branches and, above all, in the dialogue between them.

Second comment. The configuration of this particular group of scholars serves as a roadmap to establish two points. On one hand, seeing where the congress was organized, it was clear that most of the participants would come from Brazil, Japan and Germany; on the other, the remaining participants came from countries with very strong economies: European Union, United States and China. In short, it is meaningful that there were no Hispanics or Arabs or Africans etc. In other words, the excluded did not attend the congress, which is a real pity when discussing time, or working time, or historical time, or physical time, or planetary time, or time as territory. Furthermore, the ratio of women was alarmingly low, as pointed out by one of the participants in the opening session.

Arguably, the exclusion of the excluded presumed a vacuum of political discussion, evident in the questions of investigators, whose inquires ended up being overly broad – "What is time?", "How is it perceived?", "How is it conceptualized?" and "How is it used?" –, making it impossible to work on these issues from one's own position or field of expertise. More specifically, those questions skipped over the ultimate, fundamental discussion, of whether or not time exists. That is, the questions took for granted that time exists, even though this is a problematic issue; I have seen things that move in time and that grown old in their course, but I have never held a single particle of time in my hands. In brief, from my point of view, Tolstoy's recommendation was laid aside, and the world was described before anyone described the village. Admittedly, the second part of this story is still on hold, so let's see what happens when the thirteen young researchers meet again in Nagoya, Japan, to continue this dispute. □

Matthew Kleban Discusses the Arrow of Time and the Evolution of the Universe

www.iea.usp.br/en/news/arrow-time

April 21, 2015

The first conference of the Intercontinental Academia on the subject "Time", on April 21, addressed what is known about the history and the possible future of the universe, as well as the concept of "arrow of time," which posits only one direction for the flow of time, and considers that past and future are different, a notion closely related to cosmology.

The lecturer was theoretical physicist Matthew Kleban, from New York University, who dedicates himself to the study of string theory and the early history of the universe.

He noted that, contrary to what is assumed by the arrow of time, there are physical laws that posit dual direction, i.e., symmetry between past and future, although he stressed that this idea is still very confusing to physicists.

Entropy

According to Kleban, if this idea is correct, then the difference between past and future must be related "to an 'environmental' aspect, to an accident of history, such as the difference between North and South Americas, albeit universal, applicable anywhere and anytime."

When entropy ("disorder") is low, it tends to increase and the direction of its increase defines the future, said Kleban. Thus, entropy, which was very slight in the early universe, is the "environmental" factor that distinguishes the past from the future. "However, nothing prevents the arrow of time from having a reverse movement due to some other 'environmental' aspect."

Cosmology

With regard to cosmology, he first defined what this science is: "The branch of astrophysics that studies the structure of the universe in the largest accessible scale; this includes the study of birth, death (or future) and evolution of the Universe over time."

However, because the universe is 14 billion years, we can only see a portion of it, although quite vast, corresponding to the distance traveled by light in these 14 billion years, he said. "Looking at the past, we see that the universe was hotter and opaque 14 billion years ago, so we cannot see (at least directly) its birth."

Continuing with his presentation, Kleban addressed the current contents of the universe. He said there are about 100 billion galaxies, each with hundreds of billions of stars. The Milky Way has nearly 300 billion stars and a colossal black hole exists in the center of the galaxy, called Sagittarius A*, with mass equivalent to 4 million Suns, but with radius (at least in theory) only 17 times the size of the Sun. The solar system also orbits the galactic center, but the orbit lasts 200 million years.

Hubble's Law

The panel on galaxies was used by Kleban to introduce his comments about the expansion of the universe. The central figure here was American astronomer Edwin Hubble (1989-1953), whose telescope in the 1920s was able to observe approximately 50 galaxies (the Hubble Telescope, orbiting the Earth for 25 years, allows us to observe 10,000 galaxies when aimed at each 10/1,000,000 slit of the heavens).

Kleban explained that Edwin Hubble noticed something odd in the galaxies: the farther away they were, the faster they moved away from Earth. This observation led to the so-called Hubble's Law: $v = Hd$, where H is a constant with units of 1/time. With this law, it became possible to calculate when the entire content of the universe was bundled together, so to speak: 14 billion years ago.

Kleban then reversed the arrow of time, as if the history of the universe moved backward, from when galaxies were just gas, through the increased warming, the opacity, the nucleosynthesis of protons and neutrons of helium and lithium, the inflation (when the volume of the universe spiked dramatically in a tiny fraction of a second), until reaching what is known as the singularity, "where even mere speculation collapses."

He pointed out that each of these phases of the universe produced enormous entropy and that, even today, entropy is increasing. "Life can be seen as a process that accelerates the production of entropy, as stars and black holes do even more so."

Hubble's observations about the expansion of the universe created a profoundly strange idea, namely, the notion of the Earth as the center from which everything moves away, a kind of resumption of Ptolemy's geocentrism.

Relativity

Kleban explained that in 1916, ten years before Hubble's observations, Albert Einstein (1879-1955) developed the General Theory of Relativity, a sequence to the Special Theory of Relativity (1905), which had unified space and time (and energy and momentum). "In Einstein's Theory of Relativity, time is relative, elapsing slower for an object moving at high speed or immersed in a gravitational field. Even in relativity, however, time does not flow in reverse."

According Kleban, general relativity is a theory of gravity and also a radical reformulation of the nature of space and time that establishes their intimate and dynamic connection. Thus, the apparent force of gravity ceases to be a

common force and becomes something like a "pseudoforce" or "fictitious force."

After detailing some implications of this scenario, including the curvature of space-time, Kleban explained why Hubble's Law works: "It is because the universe is expanding, and this has implications for the past and for the future."

With regard to the future, some believe that the expansion will continue infinitely; the speed of expansion will decrease gradually, but will never cease. According to this hypothesis, Kleban explained, stars will eventually consume all their fuel and the universe will become cold and dead, even though this would probably not be the end, which would occur later.

Other researchers think the expansion will reach a maximum level and the universe will then begin to contract. After a finite span of time, density will be infinite, a singularity that is called "Big Crunch" (major collapse).

There are also those who consider that a threshold situation is possible between these two scenarios.

However, Kleban explained, these hypotheses hold two surprises: the first is that over the last billion years the expansion of the universe has accelerated because of dark energy. The second is that the speed of the expansion seems to be very close to the threshold speed. This would mean that the universe will continue to expand forever and will never reach zero degree or undergo an actual "hot death."

Multiverse

And how about the beginning of everything, the Big Bang? Kleban said, "some well-intentioned additions to the laws of physics can dramatically affect the nature of the Big Bang and remove the singularity without altering any experiment carried out on Earth."

One of his main interests is the so-called "multiverse" of string theory. "In string theory, the Big Bang was not a singularity or the beginning of time. It was the birth of a 'bubble' of a new 'phase'." The multiverse could harbor the emergence of numerous such bubbles.

String theory allows us to understand what existed before the Big Bang and what exists "beyond the universe" (or rather, what exists outside the visible bubble where the observable part of the universe is inserted), according to Kleban. However, he cautioned that the theory does not work with regard to "big crunches" (due to the arrow of time, actually) that the theory itself envisages. "Likewise, the theory does not work in low entropy situations."

In conclusion, Kleban said that, for him, the most attractive idea is an overall timeless universe, where almost all of time in a state of balance with near maximum entropy – only rare fluctuations of reduced entropy, which would produce a local arrow of time. However, "this idea does not seem to work, but rather predicts miracles." □

The Attempts of Physics to Build Time

www.iea.usp.br/en/news/physics-build-time

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The largest measured span of time is the 13.7 billion years since the Big Bang. The smallest is 10-18 second: one millionth of a millionth of a millionth of a second, measured in atomic excitation. From this time spectrum, physicists try to understand the experience and the flow of time.

In his lecture, Building Time in Physics – Attempts, on April 20 at the Intercontinental Academia, physicist Eliezer Rabinovici, from the Hebrew University of Jerusalem (HUJI), addressed some concepts that were discovered and developed to study the large and small scales of time, especially those used to explain the constitution of matter in unified theories and in string theory.

An expert on particle physics, Rabinovici has been director of HUJI's Institute for Advanced Study and creator of the proposal that resulted in the Intercontinental Academia.

Unified theory

"Although most of us measure from 1 to 2 meters, we boldly presume to explain the entire universe, from the smallest to the largest aspects. We want to explain and reduce everything to what is simplest. We believe we can put in one page all the equations that describe matter in the universe. That's quite a feat." Rabinovici's comment seems to indicate that, at the very least, he sees with some reservation the possibility that physics will arrive at a unified theory combining all the forces that affect matter (electromagnetism, gravity, the weak interaction and strong interaction).

He said that in the 1920s scientists knew two interactions of matter, electromagnetism and gravity, which at low energies occur in four di-

mensions – three spatial ones, the fourth being time. "When energy was increased in particle accelerators, it was found that there is one basic interaction, gravity, and five dimensions. This was a great leap in our understanding of matter."

According to Rabinovici, to evade the notion that an omnipotent equation may unify all the forces affecting matter (electromagnetism, gravity, strong interaction and weak interaction) and fully explain the constitution of matter, all we have to do is give it an infinite number of solutions. "In string theory, where strings (the components of matter) move in ten dimensions, this is what happens: we have an equation with, as far as we know, infinite solutions."

Dualities

Rabinovici mentioned that the current work of physicists is impregnated with many mysterious things that seem dualities. "Initially, all known mathematical principles become ambiguous or seem to have the same theory. One of these concepts concerns the number of existing dimensions. The theory of five dimensions provides the same description as the theory of ten dimensions. And one of the dualities is the Big Crunch [the collapse of the universe due to contraction caused by gravity], which would be a terrible event for some and magnificent to others, with each explanation being as good as another."

Relativity

Everyone now says everything is relative. This is not true, according to Rabinovici. "One of the worst representations of a theory is the fact that the Theory of Relativity is called Theory of Relativity. Einstein knew that the word was not appropriate. When asked five years later whether it might be better to change the name, he answered, 'It's too late'."

According to Rabinovici, the Theory of Relativity is an attempt to isolate what is not relative, to become a theory about what every observer can agree on. "Time has relative aspects, but it is part of something that is not relative. Cause and effect relationships are not relative. The decay time of a particle (neutrons decay in 14 minutes) is not relative."

Symmetry

He said that laws of physics are roughly the same in both directions of the flow of time, but there is a small "breach of time" that can be measured in reverse symmetry. Even if the laws of physics are symmetric, why isn't their manifestation symmetric? Why something destroyed cannot return to its previous state? To this question, Rabinovici said that that is not how things happen, because over a long course of time ("zillions of times the age of the Universe") reconstitution might occur and that something could become quite similar to what it was.

Space-time

Rabinovici said that everyone learns at school or in popular readings that time merges with the space and only space-time exists, being impossible to think of each of them separately. "Time and space do indeed merge, but some things are invariant," according to the physicist. "Space-time and gravity are closely linked and time and space are average quantities; however, they are not fundamental because they emerge from something else."

Because humans are subject to extremely weak gravity (compared to other places in the universe, such as black holes), we have a relatively stable perception of time: "Because the universe expands, it has a radius. We can say where we are in terms of the size of that radius. That is our clock." □

The Relationship between Time and Astronomy in the Theory of Relativity

www.iea.usp.br/en/news/time-astronomy

April 21, 2015

Time in Astronomy was the subject of the conference given by Hideyo Kunieda, deputy dean of research and students at Nagoya University (Japan), at the Intercontinental Academia (ICA) on April 21.

Kunieda, who is also a professor of the university's Department of Physics, addressed in particular the advances in the observation of active galactic nuclei (AGNs) with the help of X-ray telescopes, his area of expertise.

According to him, this area of research has contributed substantially to the understanding of astronomical phenomena predicted by the Theory of Relativity, such as black holes, the bending of light, and the deformation of space-time in the presence of supermassive objects.

Echoes from the past

"The light of heavenly bodies we see today was emitted long ago. Looking into space is like looking into the past," Kunieda said, noting that this is due to the huge scale of the universe: "The propagation of light in space is measured in years," he added.

For the professor, one of the positive aspects of light's "delay" is to make it possible to study the evolution of the universe over time, from the Big Bang to the present day.

According to the Big Bang theory, dominant among scientists, the universe came about 13.7 billion years ago, from a huge explosion. Planets, stars and galaxies were like splinters that progressively moved away from the center of detonation, causing the universe to expand continuously.

"The universe was fairly uniform after the Big Bang. But then the fragments grew and the stars and galaxies came about. We currently can observe a broad variety of objects," said Kunieda.

According to him, to observe faint, lighted objects in space, with little glare, is like observing the early stages of the Big Bang, when the fragments began to take shape. "To look at distant galaxies is to see how these galaxies were in the early universe."

The idea of a moving and expanding universe, a notion that underlies the Big Bang theory, was strongly influenced by Hubble's Law, according to which there is a relationship between a galaxy's distance from Earth and the speed with which it is moving away: the farther, the faster.

The law was formulated by observing a phenomenon known as "redshift," or changes in the frequency of the waves that make up the spectrum of light caused by the relative velocity between the observer and the source of emission. If the object moves away from the observer at high speed, low frequency waves become more visible and their color is shifted toward red; and if the object is approaching, the high frequency waves become sharper and the color is shifted to violet.

Thus, it was ascertained that most galaxies display a redshift and that the greater the deviation, the greater the distance between said galaxies and the Earth. "By Hubble's law, the time axis is converted into depth in space," summed up Kunieda.

Black hole

Predicted by the Theory of Relativity, a redshift also occurs in the presence of a strong gravitational field. Kunieda's research on active galactic nuclei (AGNs) is based on observations of this phenomenon through images captured by X-ray telescopes.

AGNs are supermassive (with mass up to 1 billion times that of our Sun) and very bright (up to 100 billion times brighter than the Sun) celestial bodies.

According to the professor, astronomical observations using different techniques suggest that AGNs harbor black holes – regions in space where gravity is so strong that nothing, not even light, can escape. Formed from the gravitational collapse of a star, known as supernova, black holes are the result of the curvature of space-time, the system of coordinate that underlies the Theory of Relativity.

"Near a black hole, space-time is more curved. Because of this, time seems slowed down and the light emanating from that region seems redder," Kunieda said, referring to the gravitational redshift.

He explained that the brightness of AGNs does not derive from the black holes themselves, which are invisible, but from the radiation produced by the accretion disk – the agglomeration of particles and gases surrounding supermassive objects. Because they have a very powerful gravitational field, black holes suck in all surrounding matter. And when sucked in, matter does not fall into the hole in a straight path, but rather in spirals, like a whirlwind, giving rise to a disk that gradually adds mass to the central object.

According to Kunieda, the heat produced by matter moving toward the gravitational body radiates in the disk's surface, which is visible. The redshift occurs under the action of gravity, which causes an increase in the length of the light waves. He said this phenomenon is the curvature of the light under the effect of gravity, as predicted by the Theory of Relativity.

The professor's observations involve accretion disks in the center of host galaxies. He said images obtained by him and other researchers point to the existence of supermassive objects – in this case, black holes –, as determined by the Theory of Relativity.

The Milky Way

In Kunieda's assessment, certain images of the Milky Way provide evidence that black holes exist. Obtained through infrared radiation or x-rays, these images show at first a common galaxy, with no central bright object, and therefore devoid of an active nucleus.

However, stressed Kunieda, one cloud of particles at one end of the galaxy displays an unusual light pattern, as if it was lit from below and reflected the light emitted by an object in the vicinity. According to him, this is what astronomers refer to as "reflection nebula."

"By measuring the distance between the reflection and the light source, one can calculate how long ago the light was emitted. The center of the galaxy was 10 million times brighter 350 years ago," he said, noting that the reflection nebula provides evidence that the center of the Milky Way was once an AGN.

"It's a kind of astronomical archeology. It allows us to look at past activities in the center of the galaxy," he compared. "In this case, the time axis is converted in a two-dimensional distribution."

Supernovae

According to Kunieda, observations of supernovae (explosions that herald the beginning of the death of stars) have also contributed to our understanding of the history of the universe.

The professor explained that stars, like our Sun, are bright because of the nuclear fusion of

hydrogen into helium, a process that results in loss of mass and the formation of an increasingly dense core.

When the fuel runs out, the core of the star shrinks and becomes a compact object, with an extremely strong gravitational field. The star then begins to attract all matter to its center, up to a point where the high density becomes unsustainable and the supermassive body collapses, expanding matter in a great explosion – the supernova. What remains of this collapse gives rise to black holes.

Kunieda stressed that "the records of these explosions are very useful to understand the evolution of supernova remnants that we see today." The remnants are nebulae formed from material ejected during the gravitational collapse, which speed away from the core. "In this case, the time axis is converted in a two-dimensional intensity distribution," he said. □

The Interaction between the Biological Clock and Physiological Processes

www.iea.usp.br/en/news/biological-clock

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The biological clock works in close interaction with various physiological processes to send commands to the various body organs, and to receive feedback on the body's needs. According to neuroscientist Ruud Buijs, from the National Autonomous University of Mexico, time is a key factor for regulating temperature, reproduction, metabolism, circulation and the immune system.

In a conference at the Intercontinental Academia on April 21, Buijs discussed this interaction, illustrating his exposition with numerous examples from studies of animals and humans.

He initially gave a schematic overview of the workings of the hypothalamus, a part of the brain highly connected to primitive parts of that organ and, via the autonomic nerves of the spinal cortex, to other parts of the body, sending them commands from the brain. "In addition to being essential for us to move our hand and other actions, the spinal cortex is also indispensable for the proper functioning of physiological processes. To achieve this type of physiological control we need the hypothalamus."

The biological clock, which receives information about light and dark directly from the retina, is located in the hypothalamus, near the suprachiasmatic nucleus, the primary center for regulating circadian rhythms.

According to Buijs, it is now possible to remove the biological clock of the brain of a guinea pig and keep it functioning in vitro, maintaining electrical activity in a cycle of approximately 24 hours, autonomously, without having to do anything else.

Accuracy

To illustrate the accuracy of this mechanism, he said that forensic medicine can determine with great precision the time that someone was murdered by analyzing the expression of the biological clock in their organs, especially if the victim is found within 48 hours of death.

The moment when someone comes into the world is likewise determined by the biological clock. He showed a graph showing that the birth of the first child of pregnant residents of Amsterdam peaks at around 8:00 am. (In the Netherlands, babies are generally born with the help of a midwife.) Another chart showed that the peak time was between 4:00 and 5:00 am for the second or subsequent children, something that Buijs attributes to the fact that women become more savvy regarding labor. A third

chart, however, shows a peak around noon and refers to births with obstetricians, when "babies are born in the doctor's time, who induces labor or performs a cesarean section."

In some cases, the moment of an individual's death can also be determined by the biological clock, as shown by the fact that the peak of heart attacks occurs in the early part of the morning, with greater incidence on Mondays (perhaps due to the deregulation of schedules over the weekend, ventured Buijs).

Hormones

In Buijs' view, the biological clock resorts to several mechanisms to enforce rhythms upon the body, using in many cases the hormone corticosterone. "In experiments with mice, corticosterone peak occurs soon after the night period (we know that mice are active at night), while the peak of the hormone melatonin occurs at night, indicating it induces activity in animals." In humans, melatonin also peaks at night, but unlike what happens to mice, melatonin promotes sleep in humans.

To study this process in an animal antithetical to the mouse, one with diurnal habits, Buijs used the Arvicanthis ansorgei, a wild African rodent. These animals are active in early and late daytime. "We say that the biological clock prepares our body for the onset of the active period. When measuring corticosterone in the animal, it was found that the peak occurs just before active periods, so there are two corticosterone peaks in 24 hours. This means that, somehow, the biological clock adapts to the animal's life style and adopts two peaks of activity."

The hypothalamus contains specific areas that control temperature, heart rate and food intake. The biological clock imposes a temporal pattern to them all. "These connections are strong and there is no escaping the biological clock."

Buijs said that the areas of the hypothalamus linked to food intake exert a type of influence similar to that of the biological clock, and work in harmony with it. He cited as an example the role of temporal and metabolic factors in modulating body temperature. In animals with nocturnal habits, the temperature is higher at night, then lowers and finally rises again, anticipating the active period.

The metabolism influences temperatures, so that, during the daytime period (of repose), they are low. If the biological clock is injured, the rhythm of temperature variation disappears and remains unaffected even by the metabolic factor, confirming the relationship between metabolism and biological clock.

To produce corticosterone, the paraventricular nucleus of the hypothalamus produces a hormone that leads to the production, in another part of the hypothalamus, of the adrenocorticotropic hormone (ACTH), which stimulates the production of corticosterone in the adrenal glands. Therefore, it was to be expected that upon examining the daytime and nighttime levels of corticosterone in an animal, we would find a relationship with the levels of ACTH. But that is not what happens.

To investigate this, Buijs inserted a virus similar to that of rabies in the adrenal glands of mice. Because this virus has the property of being absorbed by nerve terminals, reproducing itself in the body of the cell and migrating to other cells via the nerve terminals, it is possible to follow the chain of command from the brain to the glands.

Thus, it was possible to establish that neurons in the spinal cortex communicate with the adrenals. It was also possible to follow the impulses of the biological clock, proving that it uses not only hormones to send commands to the organs, but also autonomic pathways.

This is advantageous, because something introduced into the bloodstream will take a certain amount of time to reach the organs. With a direct connection to the organs, the biological clock prepares them for what is coming in the blood and also for the arrival of hormones.

If the biological clock uses these means to communicate with the body, what means do the organs use to respond to biological clock? "Many scientists still think the biological clock is an autonomous timepiece that requires no feedback. Of course, this is not true. We have evidence that it needs feedback. The biological clock is in constant interaction with the body."

In mammals and many other animals, this response is regulated by melatonin, which leads the body to bypass the biological clock cycle. Buijs displayed graphs showing the increased production of melatonin in a reindeer in Finland in the autumn, when the duration of night increases from less than one hour at the end of July to more than 11 hours in mid-September. Also in Finland, where the temperatures of certain periods of the year make the night flight of mosquitoes impossible, bats begin making diurnal flights to hunt for food. "Each organism makes manifold efforts to get in balance with the environment, where the length of the day/night cycle will determine the standard daily rhythm and the pace that the animal will adopt."

According to Buijs, different areas of the brain produce the same neurotransmitter. The biological clock is one of the areas that produce vasopressin, an antidiuretic hormone with vasoconstrictive effects that also acts as a neurotransmitter in the brain. The biological clock produces vasopressin for an area that is also influenced by gonadal hormones.

Buijs showed images of two areas in the brain of a mouse with vasoconstrictive innervation, one that is influenced by gonadal hormones and another sensitive to the biological clock. When the mouse is neutered, vasoconstriction in the first area disappears, but remains in the area that is sensitive to the biological clock. This would indicate the possibility of an eventual loss of vasoconstrictive innervation for physiological or functional reasons. According to Buijs, this possibly occurs through the reduction of gonadal hormones, e.g., during preparation for winter, when the animal hibernates.

The size of the testicles and the testosterone levels of the European hamster (an animal that hibernates) are much greater in summer than in winter. Both the size and the level decrease abruptly between late July and late August, apparently preparing the animal to survive the coming winter. "The hamster goes into hibernation for four or five days, wakes up for 24 hours and eats, drinks and urinates a little, then goes back into hibernation, in a very well-organized process in temporal terms. If testosterone is given to the animal during this period, it will not hibernate, will attempt live in open spaces and will die."

Images of certain area of the hamster's brain (the same one observed in the mouse of the previous example) are completely different in the summer and in winter, indicating how the animal's rhythm influences the central nervous system. The decrease of gonadal hormones prepares the animal for winter. The loss of vasoconstriction in the septum allows it to adapt its physiology and plummets its temperature to 5 °C.

Type 2 diabetes and obesity

Two other examples of disordered physiological processes possibly caused by a desynchronization between the biological clock and the physiological mechanisms themselves are, according to Buijs, the onset of type 2 diabetes and the development of obesity.

In the case of type 2 diabetes, this might have to do with the fact that the brain needs more glucose for the active period of the individual's daily cycle. The amount of sugar (glucose) consumed by the brain in 24 hours is 100 g and the quantity available for the rest of the body is 5 g. "The selfish brain competes with the rest of the body for energy. 'Compete,' however, is not a good verb, because the brain is the boss and orders that the sugar be given to it."

An experiment was carried out with people suffering from type 2 diabetes and had twice the glucose levels of people without the disease. Although the level of glucose is already quite high in patients, it begins to rise even further around 5:00 am, preparing the body for the active period of the day.

The explanation for this, according to Buijs, is that the brain becomes more active and requires more energy in the beginning of the period of greater activity. To meet the demands of the brain, the biological clock prepares the body to make more glucose available.

When the body provides more glucose, it peaks in the bloodstream quite rapidly, but then the level drops in a short time. By observing this phenomenon throughout the day, it was found that peaks in blood glucose levels decrease until the onset of the active period.

Interestingly, if you compare both phenomena, you'll see that the glucose peak in the blood corresponds to lowest glucose peak in the muscles. "This means that the biological clock is doing two things at once: on the one hand, it is stimulating the production of glucose; on the other, it is making the brain absorb more glucose. A perfect preparation for the active period of the day."

What is the role of the biological clock in obesity? Buijs said one of the correlations has to do with the period of sleep: the shorter the period, the greater the chances of developing obesity. But there's another correlation, related to factors that promote the growth of fatty tissue.

Actually, the autonomic nervous system involves two systems (the sympathetic and the parasympathetic), by means of which the brain sends commands for the fatty tissues to grow. By injecting a virus similar to that of rabies in retroperitoneal fat (the back of the abdominal cavity) of mice, it is possible to identify the area of the brain that controls the parasympathetic system – which is, in general, the system for repose. "When cutting the innervation of the system, the uptake of glucose decreases, indicating that a command from the brain is required for the fatty tissue to absorb it."

By analyzing the abdominal fat of two 14-year-old boys, one non-diabetic and the other diabetic, the clinical finding was that the accumulation of fatty tissue in the gastrointestinal compartment is associated with the disease. According to Buijs, understanding that the parasympathetic system is important for the accumulation of fat suggests that the system's commands for the gastrointestinal compartment may be stronger than the commands for the subcutaneous area. This might mean that both regions need other body signals; otherwise, the brain will not be able to distinguish between the compartments.

To resolve this doubt, markers were injected in abdominal tissue of mice and it was found that in the autonomic center (which commands the fatty tissues) there is a pair of different nerves to command the fat of each compartment. The differentiation of nerves may be followed up to the hypothalamus, where the differentiation can actually be seen in one of the structures that receive information from the biological clock. Thus, we find that the biological clock has nerves that communicate only with some part of the body and not with another.

The conclusion of these experiments is that different controls for different tissues is what enables the centralized control of fat distribution. According to Buijs, this can be seen in the fact that individuals who accumulate abdominal fat suffer an imbalance in the body's fat compartments, suggesting that some cases of diabetes and hypertension may involve this type of imbalance in the commands of the autonomic nervous system – not only in commands stemming from the hypothalamus, but in those from the biological clock itself.

Buijs' working hypothesis for future research is that disarray in the reciprocal relationship between the biological clock and the organs – at any level and at any stage of life – can result in illness. "The disease can be induced, for instance, by ingesting food at the wrong moments during the 24 hour cycle." □

Designing Transformative Models: the launching of the Intercontinental Academia in Sao Paulo, Brazil in April 2015

Today, we all live in a common context that we have named Globalization. We know how complex, paradoxical and challenging it is to live under such condition and specially to understand it. One of the most intriguing potentialities of globalization is that it allows the coexistence of multiple centralities; hubs that simultaneously and in equivalence affect its own grounds but also make a difference in a common existence in the globe. Within this condition, in the "old continent", Freiburg University's IAS - FRIAS came across a quite peculiar and interesting institutional phenomena, a common factor that could organically unite some major universities worldwide: the presence of Institutes for Advanced Studies-IAS within their academic, scientific and cultural grounds. Since that discovery was made (2010), they started an impressive endeavor for bringing together these distinguished IASs and respective universities around the world, today 36. This new and highly potential global network has already organised four Conferences (Freiburg/Jerusalem/Vancouver/Taipei). Each of them proved and reinforced the relevance and potentiality of this young network, in particular for interdisciplinary scientific encounters and the promotion of uncommon debates regarding the nature and aims of universities under Globalization.

However, UBIAS first actual output (its first "network" child) as a Glocal (Global + Local) University joint venture is the new intercontinental format that was launched on April 17, 2015, in Sao Paulo, Brazil. Designed and organized by Nagoya University's Institute for Advanced Research and University of São Paulo's Institute for Advanced Studies, this first edition has brought together —so far up to the Sao Paulo encounter— 13 young talented researchers from different nationalities and knowledge fields, and 40 scholars also from different countries and different knowledge backgrounds. The project is supported by the FRIAS, and the Brazilian phase had the support of Sao Paulo Research Foundation (FAPESP) and National Council for Scientific and Technological Development (CNPq), and the sponsorship of Itau Cultural. In its first immersive encounter in Sao Paulo, during two intensive weeks and through different stimuli, the new academic platform was able to simultaneously explore: a particular subject in an interdisciplinary mode: "Time"; the future of the universities or new models for academia; the particularities that make each one of the IASs and their respective Universities unique; the promotion of a collective and transdisciplinary project that will make an impact worldwide: a MOOC on time; and the fostering of new leadership by bringing young talented people together in interaction with diverse cultural and academic environments.

The central output of this first Intercontinental Academia's edition, after Sao Paulo & Nagoya phases, will be a MOOC —Massive Open Online Course, that is going to be part of the Coursera catalogue. It will be an intercontinental, interdisciplinary and interinstitutional MOOC on the subject "Time". This result is also a novelty for everyone. What the immersive and metalinguistic intercontinental format is showing us is that it allows the exploration of the academic universe in its multidimensional condition.

To facilitate the understanding of this complex platform that is the Intercontinental Academia, in particular the Sao Paulo encounter, allow me to present an allegory. I suggest that it should be experienced as an operetta, an operetta without one fix stage (an auditorium for example) where we all are active actors. Mind

you that it is an operetta that brings important samba and jazz contributions! After all this was the 2015 Pan American contribution to the Intercontinental Academia! Sorry Nagoya for not including an oriental influence yet, but this is to say that we are really looking forward to Nagoya's contribution to this first edition in March 2016, and already quite excited about its outcome and overall results!

Going back to the allegory; a Pan American Operetta:

Overture: staged in one of the most traditional Schools of our University: the Medical School that is located in the geographical center of USP's presence in the city. Amidst other highly significant achievements, this School is responsible for the biggest Hospital in South America. Central figures that conduct Brazilian public policies regarding Education, Culture, Science and Technology were present in that occasion. Representatives of some of the UBIAS members, and specially our partners Nagoya & Freiburg Universities.

Andante/Animato/Sostenuto: Contextual Axis: during the weekend, April 18 and 19, we explored USP's relationship to this megacity that is Sao Paulo through the experience of the flâneur! A phenomenological/ experiential way to understand the city and to realize the importance of this University in the modeling of Sao Paulo, even though the group was also faced with the shadows, difficulties, and flaws of this ongoing urban process. It has been a contextual, interdisciplinary and post-modernist approach. In this case the city was our stage.

Larghezza/Incalzando/Espressivo: from April 20 to 22 the group experienced a better known and familiar rhythm to us academics, since each perspective on time (coming from Art, Humanities, Hard Sciences, Biological Sciences and Social Sciences) was presented and shared in other two stages: the University Board's Room and IEA's events room —Time Axis: At this part of the programme, a complex landscape of concepts, theories, analysis, on time —the central theme of the future MOOC, was thoroughly explored thanks to the invaluable contributions of all invited speakers. However, with an important counterpoint: that of the debate on the future of the university (as we know it) as a universal and in some regards a homogeneous and immutable apparatus —University Axis: The start up for this debate was the Master Class of José Goldemberg, USP's President in the mid 80's, Minister of Education in the early 90's, today Fapesp's President and the central figure in the constitution of our IAS, back in 1986. Regarding the role that USP has in the shaping and promotion of public policies, two important facts happened before the opening of the Intercontinental Academia in Sao Paulo: two of the project's scientific committee members have become central figures in scientific and educational national levels: Hernan Chaimovich was appointed President of the CNPq - National Council for Scientific and Technological Development, and Renato Janine Ribeiro the Minister of Education.

Finale: from April 25 to 29, the final part of our operetta was organized with an open score, mostly by fostering group dynamic experiences. It was the time for the 13 young researchers to perform and assume a leading role, having the development of a proposal for the concept and structure of the MOOC on time as a final aim. In a plenary session on March 29, the proposal was presented to be developed in the next stage: Nagoya's immersive meeting (March 6-18, 2016).

In this publication texts produced by the critical rapporteurs and IEA's communication team gives us an idea of the Sao Paulo immersive encounter. A flashback into a memorable occasion!

Martin Grossmann
Director
Sao Paulo April 2015

The Space-Time Dimension in Digital Culture

www.iea.usp.br/en/news/space-time-dimension

April 27, 2015

According to anthropologist Massimo Canevacci, digital culture challenges the classic distinction between space and time by promoting syncretism between both dimensions and by breaking with hegemonic dualistic thinking. Canevacci, a visiting professor at the IEA, spoke on this subject at the last conference of the Intercontinental Academia (ICA) on April 27.

His exposition focused on the notion of "ubiquitime," a neologism he created to define, from an ethnographic viewpoint, "the uncentered and non-linear experiences of space-time" promoted by contemporary digital communication.

In his view, the notion of ubiquitime combines three central notions: simultaneity, "an aesthetics made of fragments from metropolises and technologies," as advocated by Futurism, the art movement; chronotope, established by philosopher Mikhail Bahktin to denote the dialogic relationship between the spatial and the temporal horizons that "has become essential to the development of literary polyphony;" and ubiquity, a metaphor that expresses the ability to be anywhere at the same time made possible by the potential for global connection of the global digital networks.

Ubiquity

In Canevacci's assessment, ubiquity is a key concept in digital culture, because it "characterizes human and non-human space-time relationships on the Internet." He recalled that the traditional definition of the term has a theological undertone and relates to the idea of an omnipresent, invisible and inescapable godhead that observes everything and everyone: "God knows everything and will judge you," he summarized.

The metaphorical nature of the definition proposed by Canevacci expands the threshold of ubiquity to the material world of everyday life, and extends "the presence of all human or divine beings to everywhere."

Ubiquitous individuals can move about between different identities, spaces and times, giving rise to the multividual, according to Canevacci. The multividual emerges from the multiplication of subjectivities beyond fixed identities: "Ubiquity defies identity, which becomes more flexible. The ubiquitous subject of ethnographic experience is a multidividual."

Empirical cases

Canevacci presented four empirical cases that exemplify the experience of ubiquitime in various cultures, starting with the Greek mythological deity Kairós, who symbolizes "a moment in an indeterminate period in which something special happens," i.e., a propitious moment for decision or action.

Unlike Chronos, the god of chronological time, whose nature is quantitative, Kairós represents unmeasurable temporality and refers us to the idea of carpe diem – living intensely in the moment – and the power to make decisions. According to Canevacci, the concept of Kairós "does not fit restricted definitions because it is situated between two concepts: action and time, expertise and skill."

He said that the ubiquitime dimension in Kairós refers to what he calls "methodological stupor" or "undisciplined methodological wandering" – an attitude of openness toward the unknown that enables "ethnographers to turn and move, stride and walk with abandoned slowness and attention to detail," always willing to observe and grasp spontaneous and casual study objects.

The second case mentioned by Canevacci was the post-Euclidean architecture of Zaha Hadid. According to him, Hadid builds hybrid forms that break with the classic rules of composition and representation of space-time. "[Hadid] transforms non-normative geometry into mysterious, distorted and impure geometric shapes," he said.

The funeral rites of the Bororo, an indigenous people studied by Canevacci, was the third empirical case presented at the conference. The rites are long and complex, and involve burying the body in a shallow ditch, waiting for the decomposition of tissues, cleaning the skull, and special ornamentation for the final farewell ceremony.

Canevacci explained that in the final stage, which lasts three days, time is suspended. "It is a period when there is no time, only the celebration of the ritual that reaffirms that no distance exists between life and death, between space and time."

The last example, also related to the Bororo, was the "multividual subjectivity" of Kléber Meritororeu, a Bororo native. For Canevacci, Meritororeu embodies the idea of the multividual because he traverses from one identity to another: he is at the same time a native who lives his culture on a daily basis and a teacher at the Indigenous State School "Sacred Heart of Jesus" in Meruri village, in the city of General Carneiro, state of Mato Grosso.

"He has two identities: he is a Bororo and a teacher," Canevacci said, stressing that Meritororeu faces the challenge not only of connecting these two identities, but also of self-representing himself with the aid of digital technologies – all this without letting go of the traditions of his people – to combine digital culture and Bororo culture.

"The use of technology by the natives helps the development of a decentralized network that cannot be compared with any analog network," he explained. "The dichotomous relationship between technology and culture, science and arts is obsolete," he added. □

Fossils as a Tool to Analyze the Dynamics of Biodiversity

www.iea.usp.br/en/news/dynamics-biodiversity

April 22, 2015

Understanding the dynamics of biodiversity requires a very broad time frame. That was the central argument of environmentalist Tiago Quental, from USP's Biosciences Institute, at the conference The Dynamics and Inductors of Biodiversity in Geological Time, presented at the Intercontinental Academia on April 22.

According to Quental, there are two types of data that act as "time machines" in our understanding of biodiversity: the genome and the fossil record. In the case of the genome, our job is to use it in a historical way: "We have sequenced the DNA of different species and reconstructed a diagram of what we call phylogenetic tree, which basically shows the relationships between different species."

Another important feature of the genome is the fact that it accumulates mutations over time. "We can use this kind of molecular clock for an eventual calibration and instead of determining distances between similar and dissimilar DNA, we can relate them to an absolute time," Quental said. This allows us to build very sophisticated statistical methods, because the DNA's clock does not have regular beat. "For instance, it is possible to establish that the common ancestor of two species may have existed 7 million years before either of them, or to estimate when a lineage of dogs invaded South America."

Fossils

Quental devoted most of the conference to the other "time machine," the fossil record. He said that the fossil record, although incomplete, is our best resource for understanding biodiversity over a large time spectrum: "Fossils are excellent for some groups, like dogs, and very meager for others." Hence the importance of simultaneously using DNA, which allows us today to sequence almost all living lineages.

The environmentalist said that of the 4 billion species that evolved on Earth over the last 3.5 billion years, about 99% have disappeared. "If we didn't have the fossil record, we would have no clue of the magnitude of extinction."

Fossils, however, don't inform only about extinctions; they also contain data on ecology and morphology (e.g., extinct animals were much bigger than today).

The dynamics of diversity

Quental said that the history of biodiversity is characterized by a continuous replacement of species and strains. "The dynamics of diversity is different for each lineage, whereby expansion is followed by decline. To understand this dynamics," he said, "one must know how the rates of emergence and extinction of species in a lineage change over the geological time scale."

To illustrate the possibilities of research with fossils in the context of biodiversity, Quental presented two studies he carried out with other scholars. The first dealt with the dynamics of diversity of branches of terrestrial mammals that became completely extinct or underwent a decline in diversity during the Cenozoic (65 million years ago). This work was conducted with Charles Marshall, from the University of California.

The researchers worked with 19 families of terrestrial mammals (half of them already extinct). It was observed, for instance, that these

families had similar ecologies and that the diversity of the horse family is decreasing today.

According to Quental, what they wanted to know was whether the longevity of a family is merely the consequence of an episode of "gambler's ruin," that is, if it is due to random fluctuations of intrinsically constant rates of emergence and extinction of species. The conclusion was that this is not so and that, in fact, there is a deterministic component in the process, related to the inability to maintain the pace of diversification in face of environmental deterioration. Furthermore, failure in originating new species appears to be as important as changes in the extinction rate in terms of inducing the decline of diversity during periods with no environmental abnormalities.

Replacement of families

The second study that Quental presented dealt with mechanisms of sequential replacement in various subspecies of dogs in North America. The work was carried out in partnership with Daniele Silvestro and Alexandre Antonelli, both from the University of Gothenburg (Sweden), and Nicolas Salamin, from the University of Lausanne (Switzerland).

The family of dogs (Canidae) split into three major subfamilies soon after its emergence 40 million years ago. The three subfamilies existed simultaneously for a long time. Two of them (Hesperocyoninae and Borophaginae) became extinct, but Caninae, with 36 species, continues strong, including all dogs currently alive, as well as foxes and wolves.

The study found that the two subfamilies became extinct because they failed in the speciation process and because of an increase in their extinction rate. Another finding was that competition between subfamilies is an important evolutionary force and can affect, separately, the rates of speciation and extinction. □

Conference Discusses the Social Jet Lag Syndrome

www.iea.usp.br/en/news/social-jet-lag

April 21, 2015

The modern lifestyle has led many individuals to develop what chronobiologist Till Roenneberg, professor and vice-president of the Medical Psychology Institute at Ludwig-Maximilians University (Germany), defined as "social jet lag" syndrome – the physical and mental impairment caused by a mismatch between the biological clock that regulates an organism's physiological activities and the social clock that determines one's daily personal and work commitments.

Roenneberg spoke of the causes and effects of this syndrome at the conference Circadian Behavior and Sleep in the Real World, held on April 21 as part of the program of the Intercontinental Academia (ICA) on the issue of "Time."

According to the professor, social jet lag can be defined as a discrepancy between internal body rhythms and external environmental rhythms. It is very similar to what happens when a traveler crosses several time zones in succession: the sudden changes lead the body clock (which is adjusted to the time of the place of departure) to conflict with the local clock.

Unlike ordinary jet lag, however, the effects of which are transient, social jet lag is chronic, forcing individuals to fight systematically against their own biological clock in order to cope with the demands of everyday life – and this include ever-longer working hours and greater difficulties to reconcile professional and personal life.

"Everything in our body is controlled and organized by the circadian system. The circadian system, in turn, is not organized by the social clock, but rather by the clock of the Sun, by the clock of light & dark. So there will always be a discrepancy between what society wants us to do and what, under the conditions of modern life, our body wants us to do," noted Roenneberg.

Some people compensate this discrepancy between biological and social rhythms by extending their period of activity and reducing their period of repose. According to Roenneberg, those who suffer from social jet lag are generally early risers who remain active until late at night to cope with their daily commitments. In the end, however, things don't add up for them: they sleep less than eight hours a day and are therefore chronically sleep-deprived.

One can measure this "negative sleep balance" by comparing the pattern of their circadian behavior during weekdays, governed by the social clock, and during their free days, governed by their biological clock. "If we measure the difference between both patterns, we will obtain a quantifiable measure of what we call 'social jet lag'," said the professor.

The afflictions of modernity

The negative sleep balance is at the root of many afflictions of modern society, especially those related to metabolic problems. "The greater the social jet lag, the greater the likelihood of becoming obese, developing diabetes, using drugs, smoking to relieve stress, and drinking alcohol to slumber off when one is not yet ready to sleep," warned Roenneberg.

The implications of social jet lag also extend to the realm of behaviors. According to the chronobiologist, one of the first qualities that disappear when someone sleeps too little is social competence: "You become a true psychopath if you don't sleep enough."

For him, the social jet lag syndrome is associated with the idea that sleep keeps us from becoming more productive: "People tend to sleep one hour less in order to remain active for one hour more. Yet, sleeping does not mean ceas-

ing to be active, but rather preparing the body and the mind for activity."

He explained that simple math underlies this statement: "If someone sleeps one hour less, depriving themselves of 1/8 of their sleep period, they only gains 1/16 in terms of activity. On the other hand, their efficiency is reduced by about 1/20."

The result, he said, is a vicious cycle – one that has become endemic in the United States. "You lose efficiency, so you have to work more and more; to work more, you have to sleep less; and by sleeping less, you lose efficiency."

In his assessment, the widespread use of alarm clocks is evidence that overall people sleep less than they should. "What is the fundamental issue underlying the use of an alarm clock? That we have not completed our biological sleep period! Otherwise, we would need no help to wake up," he warned. "We must change our attitude toward sleep," he added.

Chronotypes

In addition to propelling social jet lag, the modern lifestyle also contributes to an extreme expression of the so-called chronotypes – the classification of individuals according to the preferences of their body regarding the time they perform daily activities such as sleeping, waking up, working out and exercising the mind.

There are two main chronotypes: the "morning people," who sleep and rise early, and reserve the night period to sleep; and the "evening people," who prefer to sleep and wake up late, even if that means dedicating part of the day to sleep.

Roenneberg said that, in terms of their circadian behavior, these two chronotypes are growing farther and farther apart because of how the patterns of exposure to natural light are changing in the modern age.

According to him, throughout the course of evolution, our biological clock was synchronized with a light/dark cycle regulated by exposure to sunlight: "The environment in which we were synchronized during the last thousands of years was one of much light during the day and no light at all at night. The morning and evening chronotypes existed, but the distance between them was not significant."

However, the dissemination of electric lighting and the habits of modern life have imposed different levels of exposure to solar and artificial light. Indeed, the luminous signals that help synchronize internal body rhythms and external environment rhythms are being minimized.

Roenneberg used the ICA's own dynamics as an example: in daytime, when people should normally be exposed to the Sun, participants were confined indoors, with little natural light; at night, on the other hand, when the body should be in the dark, they were exposed to a prolonged period of artificial light. "We are darkening the day and illuminating the night. And this light is increasingly turning us into evening people," he said.

According to him, exposure to artificial light at night would hardly make a farmer become an evening person, because, when working outdoors, under the Sun, he would signal to the biological clock that sunlight, stronger and natural, was the real light. "It is the contrast between light and dark that synchronizes our biological clock, making us sleep from 10 pm to 6 am," he said.

In Roenneberg's view, unlike what is commonly thought, being an evening person does not imply any type of pathology. "There is no innate timing of the circadian clock," he explained, pondering that sleeping and waking up later is "a natural reaction to the environment where one lives, a normal way for the circadian clock to synchronize a body that is not being sufficiently exposed to light."□

Discerning the Biological Clock of Single-Celled Organisms

www.iea.usp.br/en/news/single-celled-organisms

April 22, 2015

The biological processes of most living beings are governed by the so-called circadian clock, a kind of natural timepiece that adjusts internal vital rhythms to external environmental rhythms, regulating cellular metabolic activity according to cycles of light and dark. Synchronized with a 24-hour time period, this clock is what causes a person to feel sleepy at night, remain awake during the day or feel jet lag when traveling across time zones.

Although the workings of the circadian clock in complex, multicellular organisms has been the object of research for a long time, studies on the biological rhythms of microorganisms are rather recent. In a conference at the Intercontinental Academia (ICA) addressing the main theme "Time," on April 22, Takao Kondo spoke about the progress he has achieved in this field with experiments involving prokaryotes – unicellular organisms lacking some organelles and a nuclear membrane.

Kondo is a professor of Biological Sciences at the University of Nagoya (Japan) and member of the Scientific Committee of the Institute for Advanced Research (IAR) at the ICA. He is known for having been the first scientist to reconstitute a circadian clock in vitro, laying the foundation for numerous discoveries on the molecular basis of biological rhythms.

At the conference, Kondo presented the results of experiments that he carried out to demonstrate the occurrence of circadian clocks in the Synechococcus elongatus cyanobacterium – a unicellular photosynthetic bacterium, similar to blue-green algae, which is at the base of the food chain in marine environments. Ac-

cording to Kondo, "cyanobacteria are the simplest organisms that display circadian rhythms."

A question of genetics

Kondo's great headway was to identify a group of genes – known as kaiABC – that controls the Synechococcus' circadian clock. He explained that the phosphorylation and dephosphorylation cycles of the protein encoded by the trio of Kai genes – KaiA, KaiB and KaiC – act as regulators of the biochemical mechanism that times the daily rhythms of cyanobacteria.

Phosphorylation is the metabolic process of adding a phosphate group, donated by an ATP (a molecule that stores energy), to a protein. Dephosphorylation, in turn, is the removal of a phosphate group.

The dynamic addition and removal of phosphate, catalyzed by the kinase and phosphatase enzymes, inhibits or activates the expression of a gene, i.e., its encoding in a protein. That is why it is one of the main mechanisms for regulating proteins.

The discovery of the role of the Kai genes in the metabolism of Synechococcus cleared the way for the in vitroreconstitution of the circadian clock of cyanobacteria. Toward this end, Kondo mixed the trio of Kai proteins with an ATP molecule in a test tube.

The incubation confirmed the hypothesis that, in the presence of these four elements, the 24-hour cycles of cyanobacteria occur autonomously, even in the absence of external "time cues," such as the alternation of light and dark.

The experiment showed that the processes of phosphorylation and dephosphorylation of the three Kai proteins are interconnected and generate a threaded cycle of protein activation and inactivation. Kondo noted that the oscillation of the gene expression of these proteins acts as the time stamp of the Synechococcus' circadian clock and that "the state of phosphorylation of KaiC is the central component of this system."

According to Kondo, the circadian rhythms generated by the oscillation of KaiC act as a molecular timer that regulates the entire metabolism of cyanobacteria.

Mechanical clock

Kondo compared the circadian cycles of the Synechococcus to a mechanical timekeeping system: "The Kai protein clock is designed much as a grandfather clock."

He said that the oscillation between the phosphorylation cycle of KaiC and the gene expression of KaiA and KaiB resembles the mechanism of the pendulum: as the escapement transmits timekeeping to the clock's hands, the pulses generated by Kai proteins transmit temporal signals to the cell, performing the fine adjustment of vital processes that depend on synchronization with external factors.

He also drew attention to the accuracy of the biological rhythms of cyanobacteria. "Nature imitates art. The circadian clock of the Kai protein seems to have been designed by a master watchmaker," he concluded. □

Climate Time Scales and Climate Change

www.iea.usp.br/en/news/climate-time-scales

April 22, 2015

After humans began to recognize cycles and patterns in nature, the uncertainties of the future became less distressing, at least with regard to matters such as obtaining food and seeking shelter from inclement weather. But how should we react when the very future of life on our planet is at risk because one of the environmental variables has reached an unanticipated level?

According to astrogeophysicist Luiz Gylvan Meira Filho, former visiting professor and currently member of the IEA's Environment and Society research group, humanity is entering a period when it is difficult to predict what might happen, "because in the last 800,000 years the concentration of atmospheric CO2 never exceeded 280 parts per million (ppm), and we have now reached 400 ppm."

Meira Filho, who is one of Brazil's leading experts on climate change and international climate negotiations, talked about the time scales of climate and of climate change in his conference at the Intercontinental Academia on April 22. For him, climate change should be seen in the context of time and treated as an urgent issue, "but not in the sense that something catastrophic may happen tomorrow or next week."

During his exposition, he presented several graphs extracted from the 2014 Climate Change Synthesis Report prepared by the United Nations Intergovernmental Panel on Climate Change (IPCC).

CO2 Concentration

According to Meira Filho, the "proxy data" (data collected by paleoclimatologists from natural records of climate variations, e.g., stomata, phytoplankton and paleosoils) allow us to analyze the history of climate over a very long time. "In the very distant past, there have been concentrations of CO2 higher than the current 400 ppm. Three and half million years ago, it was 200 ppm and between that time and 800,000 years ago, CO2 concentration often reached 400 ppm."

However, when we observe a shorter period of time, up to 800,000 years ago, and also consider three astronomical variables that affect climate (orbital obliquity, orbital eccentricity and the precession of Earth's axis), "we find that we are in a period when the concentration of atmospheric CO2 should reach a maximum of 280 ppm; it never reached 300 ppm in the last 800,000 years."

It turns out that very recent history, as verified by measurements at the top of the Mauna Loa volcano in Hawaii, shows that CO2 concentration was 320 ppm in 1970 and reached 380 ppm in 2005. According to Meira Filho, measurements at Mauna Loa began in 1958 and, at that time, already exceeded the 280 ppm typical of the pre-industrial period. "Nowadays, we don't need to read scientific journals; the daily newspapers tell us that levels have reached 400 ppm."

"This increase was caused by man. It is relatively simple to measure and apply the scientific method to find that CO2 concentration is increasing. And, by analyzing several hypotheses, we can conclude that this is due to the burning of fossil fuels." For Meira Filho, this conclusion is supported by the fact that there are no natural processes that burn fossil carbon in significant amounts. Even volcanic activity releases relatively small quantities of CO2.

The greenhouse effect

He explained how the greenhouse effect derives from excess CO2 in the atmosphere: "Our planet receives energy from the Sun and radiates part of it back into space in the form of infrared radiation, which acts as a cooling mechanism to maintain the thermal balance of the Earth's surface. There has to be an equilibrium, otherwise the planet will heat up or cool down. CO2 absorbs infrared radiation, unbalancing the system and causing the greenhouse effect, which warms the surface of the Earth."

According to him, climate is determined by the absorption of electromagnetic energy from the Sun in the visible spectrum. "This does not occur uniformly, because tropical regions receive more energy than the polar ones. This difference in energy deposition causes the movements of the atmosphere and the transfer of energy. The oceans are also involved in the process. This is how climate models and their dynamics came about."

From the point of view of science, the greatest dilemma has been the fact that climate change as reported in the newspapers cannot be observed: "In geophysics and astrophysics, we usually can't apply the scientific method of laboratory experiments; things have to be done piecemeal. The beginning of this story has been solved with the finding that the increase of atmospheric CO2 is due to emissions caused by man. The result, i.e., the impact on the climate, is harder to explain."

Numerical models

What scientists have been doing for years is "to improve the numerical models so as to predict weather a posteriori, that is, to predict today how climate evolved over the last century." This job requires increasingly powerful supercomputers. However, according to Meira Filho, the physics behind it is very simple and uses "well-known and very stable laws of conservation of mass, energy (first law of thermodynamics) and momentum (Newton's law). They are written in the form of differential equations with respect to time; we take a numerical quantity at a certain point in time, integrate the variants numerically and find the value in the future."

"These models have been significantly improved, to the point of being able to estimate rather accurately how climate evolved over the last 100 years vis-à-vis how it actually developed. Once this is simulated in a computer, we can easily change the procedures to take into account increased atmospheric concentration of greenhouse gases and see what happens."

Future scenarios

The result is the realization that we must reduce the emission of greenhouse gases to control the rise in temperature. He showed graphs with four possible scenarios for 2100: 1) increase of 3.5 °C in the average temperature of the planet's surface as early as 2100 and a trend of sharp increases in the following centuries if the emission of greenhouse gases continues to grow at the current rate; 2) increase of 0.5 °C if all emissions cease now; 3) increase of up to 2 °C (agreed at the UN Conference on Climate Change in December 2009 in Copenhagen), provided all countries concur to lower their emissions accordingly at the conference that the United Nations will hold in December in Paris; 4) increase of up to 3 °C if decisions adhere only to what was defined in Copenhagen.

According to Meira Filho, the climate system has essentially two memories: the first one has to do with the fact that greenhouse gases remain in the atmosphere for different periods (ten years for methane and more than 100 years for nitrous oxide; in the case of CO2, the decrease is related to the level of biological activity on the planet); the second memory concerns the slow warming movement of the oceans, governed by maritime currents, which are relatively slow.

The permanence of gases

The combination of these two memories leads the maximum effect on climate change of methane to take place 20 years after the emission, and of carbon dioxide and nitrous oxide, 40 to 50 years. "This means that if we want to stabilize temperature in 2100, we have to stabilize emissions by 2050 and this depends on the industries and the infrastructure that are being planned today. Hence the urgency of dealing with the problem."

Meira Filho concluded with a warning based on another scientific methodology: "If we look at this scenario using the concept of phase space and if we place in the coordinates of a multidimensional space one of the important variables that describe the climate system over time, the conclusion we reach is that we have already entered a phase space that we have never occupied in the last 800,000 years. This is scary, to say the least. We are in uncharted territory and this brings risks to the continuity of life." □

The Importance of Biodiversity for the Future of Life

www.iea.usp.br/en/news/biodiversity-future-of-life

April 25, 2015

It is significant that the Intercontinental Academia commenced in 2015 and tackled "time" as its central theme, because this is surely a critical year when humanity must make urgent decisions about its future.

On three occasions this year, world leaders are deciding about forthcoming decades. In July, the heads of state gathered to discuss how to finance development. In September, the United Nations' Sustainable Development Goals were adopted. In December, UN member countries will negotiate the new Global Climate Agreement.

To discuss the difficulties imposed upon life on our planet in the recent past, global transformations and the prospects for biodiversity in the coming decades, the Intercontinental Academia invited biologist Vera Lúcia Imperatriz-Fonseca, from the Biosciences Institute of the University of São Paulo and coordinator of Ecosystems Services research group of the Institute for Advanced Studies of the University of São Paulo - IEA-USP.

On April 25, Vera Lúcia gave the conference Biodiversity and Global Policies, in which she addressed the impact of human actions on the environment, highlighting the growing loss of biodiversity and the negotiations that could lead to the protection of ecosystems and to mitigating the effects of climate change on them.

Vera Lúcia adheres to the proposal that classifies our planet's history from the onset of the Industrial Revolution, in the 19th century, as a new epoch, the Anthropocene, which follows the Holocene that began 11,500 years ago, at the end of the last glaciation. The intense, human-induced transformations of the environment would be the defining feature of the Anthropocene.

Vera Lúcia also stated that several important indicators related to global change began to grow exponentially in the mid-20th century, including total world population, use of previously virgin land, world Gross Domestic Product (GDP), river drainage, fertilizer consumption, water use, paper consumption, international tourism, use of motor vehicles and urban population. One consequence of this situation is that an enormous portion of the Earth's surface is now occupied by urban areas, agriculture and livestock.

According to her, we should take notice of the huge amounts of carbon emissions that are "transferred" from country to country by the international trade of goods. The same applies to the use of water in the production of industrial and agricultural goods. She said that, in these

terms, China is a major importer of water, "although it is also adopting various measures to restore the environment for future generations."

She said that in 1700 the world population was 650 million and that less than 2% of terrestrial ecosystems had been altered, whereas the forecast for 2025 is that population will reach 8.2 billion and that more than half of the ecosystems will have undergone change.

Vera Lúcia reported that awareness of the environmental and sustainability issues has grown since the 1972 Brundtland Report of the World Commission on Environment and Development and subsequent forums on biodiversity and climate negotiation, such as Rio 92, Rio +20 and others.

She also mentioned the hurdles we face to adopt international policies for the benefit of the environment, such as the Millennium Ecosystem Assessment (MA) initiative.

In 2000, the then UN General Secretary, Kofi Annan, asked 1,360 experts to expound the importance of preserving nature. This survey resulted in the Millennium Ecosystem Assessment, which assessed the consequences for human well-being of changes in ecosystems, as well as the scientific bases for actions needed to improve ecosystem conservation and sustainability.

However, Vera Lúcia stated, when the effort was presented to UN-member states, they did not embrace it, because they deemed it was an initiative of the UN Secretariat and not something negotiated and approved by the signatory countries of the organization.

According to Vera Lúcia, after governments rejected the MA, a group of countries, with the active participation of then French president Jacques Chirac, began to wonder if there might be new possibilities for dealing with biodiversity and they "eventually organized a panel similar to the Intergovernmental Panel on Climate Change (IPCC)."

"Chirac believed that much was already known about climate change, and that similar work had to be carried out with regard to biodiversity."

In the UK, there was talk of a "perfect storm," characterized by population growth, sprawling urbanization and climate change, comingled with the goals of poverty reduction, namely, the need to provide more food, more water and more energy to those in need.

The proposal asked several questions, including whether 9 billion people can be fed equitably, sustainably and healthily, how to deal with the future demand for water, how to provide sufficient energy, how to mitigate the effects of climate change – and if all this could be done while preserving biodiversity at an acceptable level.

"Preservation is essential because biodiversity takes a long time to come about; furthermore, the morphology, anatomy and appearance of animals are very important aspects of genetic biodiversity – and we will need them if we hope to face the manifold upcoming transformations, especially those resulting from climate change. Molecular tools provide examples of how to identify populations, and how to assess if they are suited for thermal regulation or have the ability to live in harsh environmental conditions."

Vera Lúcia recalled that the UN would adopt a new agenda in September, the Sustainable Development Goals (SDG), developed by researchers. "In this new paradigm, we have the economy at the center, the society around it and the system supports life on Earth surrounding both."

This unified panorama comprises a set of six goals derived from combining the Millennium Development Goals with the conditions necessary to ensure the stability of the Earth's systems.

The six goals are: better living conditions and livelihoods, sustainable food security, sustainable water security, universal clean energy, productive and healthy ecosystems, and governance for sustainable societies.

In the final part of the conference, Vera Lúcia spoke of a project in which she is directly involved: the Intergovernmental Platform on Biodiversity and Ecosystem Services (EPBES), launched in April 2012. The platform was created by the international community as an independent intergovernmental body open to all UN members.

The initiative aims to provide politically relevant knowledge of biodiversity and ecosystem services to support decision-making, and currently includes 124 member countries, as well as several United Nations partner agencies: the Food and Agriculture Organization (FAO), the Educational, Scientific and Cultural Organization (UNESCO), the Environment Program (UNEP) and the Development Program (UNDP). □

Participants of the Intercontinental Academia present results of the event

www.iea.usp.br/en/news/closing-report

April 29, 2015

The detailed thematic structure of a MOOC (Massive Open Online Course) on time and the prospect of several scientific papers resulting from partnerships between the young researchers that have participated in the Intercontinental Academia were the main outcomes of the first immersion period of the project, held at the IEA-USP from April 17 to April 29.

David Gange (University of Birmingham), Nikki Moore (Rice University) and Helder Nakaya (USP), three of the participants, presented the Closing Report to the members of the project's Senior Committee during the last session of the encounter.

Goals of the MOOC

According to them, the MOOC to be produced will be a kind of interactive online guide for students and researchers who want to develop or expand their interest in the concept of time. For now, there are three name options for the course: "On Time", "Thinking with Time" and "What Time Is It?".

The expectation is that the users of the MOOC acquire skills to synthesize arguments from large areas of knowledge, learn to analyze evidence in order to form their own ideas on the raised issues, develop the ability to deal with conceptual materials and think transversely to the disciplines involved.

Students should collaborate in the construction of scientific knowledge at the same time as they develop their framework of knowledge

Course structure

The young researchers have in mind a MOOC with four central themes chosen after a group evaluation on the key subdivisions of the concept of time.

All content will be studied from 14 topics, 13 of them related to at least one of the four core subjects and involving various disciplines, both the sciences and the humanities. The completion of the course will have an additional topic which will focus on the future of the concept of time.

Core subjects

Is time essential or a cognitive phenomenon? Does it require change? What exists in time? Is time an independent entity as suggested by physics and philosophy? Is it absolute or relative? These questions will try to answer the question of the first central theme: "What is time?".

"How is time perceived?" is the question that defines the second central theme. It raises a number of issues to be studied, including the following:

- Can we perceive time?
- Is it possible to make reliable judgments about temporal properties?
- Can one perceive time without change?
- What is the relationship between experienced time and neural time?
- How is it possible to experience events that last in time (movement, change, succession, melodies) as something extended in time?

The functional concept, the mutant concept and the standardization of time, the mental time travel (chronesthesia), the opposition between linear time and cyclical time, and (in anthropology) between deictic time and sequential time will be analyzed in the third central theme: "How is time conceptualised?"

The question that defines the fourth central theme is "How is time used?" The issues to be discussed approach time as something relevant to subjects such as astronomy, biology, chemistry and medicine as well as how narratives use it creating linearity, circularity or even its fractionation. The importance of time in social interaction (time management, punctuality, working and leisure hours), history, traditions and other aspects also deserve attention.

Topics of study

The 14 topics of the course have been established through specific questions which are broken down into sub-questions:

- How is time measured?
- What traces does time leave?
- Is there a relationship between time and causality?
- Is time relative?
- What are temporal illusions and what can we learn from them?
- Does time have a history?
- Why is the present special?
- Can we predict the future?
- How do different rhythms interact?
- What does symbolic representation do for human understanding of time?
- Do non-humans have individual time?
- Is time running out?
- How do we value time?
- What is the future of the time concept?

Means

Each topic will be covered in a class which will feature videotaped speeches, animations, questions and 5-8 films of 7-15 minutes each.

There will be a discussion forum in which the students will be encouraged to provide answers on questions raised by the course and other students.

There are also plans for a multimedia reading list, a kind of database with links and relevant content separated by levels of complexity. The idea is that students can write short comments on the presented material's support itself.

Target audience

The MOOC will be designed at a level of scientific complexity that should be "suitable for intellectually ambitious graduates." However, it will not be necessary that the students have previous specific qualifications as this would not match the diverse academic profile of those responsible for the initiative, who do not have an area of common knowledge to everyone. It would also be incoherent with the general spirit of this type of course.

The introduction of complex ideas will be made from the basic concepts domain, since each student is a beginner in at least some of the subjects comprised in the MOOC.

Additional results

Biologist Helder Nakaya presented the potential additional results that the Intercontinental Academia can provide besides the MOOC.

The first one is to send a "letter to the editor" of some interdisciplinary journal of world prestige. This contribution will address the importance, the key features and the project's results.

Even the contact of the young researchers throughout the project should result in interdisciplinary scientific articles, which might also be possible from the processing of the data to be collected through questionnaires answered by the students of the MOOC.

The production of a video with various multimedia features on all the work being developed in the Intercontinental Academia will be considered.

Interdisciplinarity and cooperation

The results presented during the Closing Report have shown that the first immersion period of the Intercontinental Academia (the second one will be held in Nagoya in March, 2016) was extremely productive, consolidating an initiative of the IEA-USP and the Institute for Advanced Research of the Nagoya University which began to be conceived in March, 2012, during a meeting of the UBIAS network's Steering Committee at the Institute for Advanced Studies Jawaharlal Nehru, in India.

Nikki Moore and David Gange highlighted the atmosphere of everyone's disciplinary "lack of knowledge", which enabled an intense interaction between experts from various fields.

They said that even the logistics of the meeting, with meals in common, lodging at the same hotel and social activities together, was an important factor for establishing links between the participants. Gange said it has been the academic gathering of most sociability he has ever participated in and that he has laughed a lot thanks to the good mood of everyone involved.

The fact is that the friendly and cooperative atmosphere played a key role for the high productivity of the meeting, which involved more than two dozen conferences and seminars with senior researchers, and numerous work meetings with the 13 young researchers of the project.

On the way to Nagoya

After the presentation, a video with a greeting from the director of the Nagoya University's IAR, Hisanori Shinohara, was shown to all members of the Intercontinental Academia, congratulating them on their work during the two weeks in São Paulo and wishing them a good stay in Nagoya in March, 2016, for the project's second period of immersion. □

Higher Education Should Strive to Sharpen Minds, According to Minister of Education

www.iea.usp.br/en/news/ministry-education

April 24, 2015

In the assessment of Renato Janine Ribeiro, Minister of Education, the university of the future should be conceived in terms not only of training for specific careers, but also of comprehensive cultural development to broaden and diversify people's worldview. He spoke on this issue at a workshop with the participants of the Intercontinental Academia (ICA) held in the morning of April 24.

Janine, who is also member of the IEA's scientific committee for the ICA and coordinator of the institute's research group The Future Inquires Us, stressed that his exposition was not an official speech as minister, but a utopian exercise aimed at reflecting on what the university might become in the next forty or fifty years.

For him, the main issue to consider when imagining the university of the future is the need to go beyond professionalization: "We must think of a higher education system more concerned with sharpening minds to help them understand reality better."

The professional life of many graduates from some of the most popular university courses in Brazil attest the need for change. According to Janine, nearly 20% of medical school graduates do not go on to become doctors. "This should set off an alarm signal, because students devote six years to a very difficult and very specific course and then leave everything aside," he noted.

The situation is more worrisome in law schools. The minister said that although data are not accurate, most graduates do not pass OAB's bar exam and, therefore, do not practice law. The same pattern is repeated in management courses and many others. "We are convinced that we have to change our curricula to offer broader university courses." The first step toward this, he pondered, is to revamp the agendas of the universities and prepare them for changes that are already underway, two of which he underlined: diminishing social inequality and increased longevity.

Equality

Recalling ideas of French thinker Alexis de Tocqueville, "a shrewd observer of the 19th century political scene," Janine said we are moving into an increasingly egalitarian world, in which social inequalities will not disappear but will lose their old justifications, a world that will see significant advances in the rights of those who were formerly excluded from it.

"Looking at the past 250 years, one can see that equality has indeed increased in terms of social justice, freedom and diversity, with greater inclusion of women and other groups historically discriminated against," he said.

Social mobility in Brazil over the past decade would be example of this. Janine recalled the well-known images of the social pyramid and lozenge: in 2005, Brazilian society could be represented by a pyramid: a base made up of 100 million people in conditions of great poverty and misery, the so-called D and E classes; the mid-range, corresponding to the C class, had 50 million people; and at the top were the 40 million that constituted the privileged A and B classes.

By 2010, the pyramid had given way to a diamond-shaped lozenge: the base was reduced to 50 million people; the mid-range doubled in size to encompass 100 million people; and the top richest gained momentum, rising to 50 million. "In five years, 25% of the population in extreme poverty joined the C class, acquiring lower middle class status."

If society is becoming more egalitarian, Janine reckoned, one can assume that access to university will tend to become a universal right. "If we hope get close to providing higher education to everyone that wishes, the university will have to be different: it cannot continue to focus on professional training, but must provide an overall cultural education that gives meaning to people's lives," he concluded. The university will become part of the life of every citizen and an expression of the education required for a person achieve personal and professional fulfillment in life.

In his view, Brazil is already moving toward broad access to higher education, although it is still far from reaching the ultimate goal. He cited some data to support his point of view: in 1968, when he became a Philosophy undergraduate, Brazilian universities had approximately 100,000 students. In 2003, the number was already slightly more than 3 million, and today it exceeds 7 million, or 20% of the population in the 20-29 age bracket. "When a country reaches the 15% tier, it ceases to be elitist in terms of access to higher education. Thus, we are currently no longer an elitist nation. We still have a long way to go, to be sure, but we have progressed," he said.

Longevity

The second transformation mentioned by Janine refers to the exponential increase in the population's life expectancy. According to the minister, we are moving toward a time when to live 100 years will no longer be an exceptional feat and will become commonplace. "In this new world, the choices you make when you're 20 cannot determine the results you will obtain when you're 60," he warned.

For Janine, increased longevity brings up the question of openness to changes, which are likely to become more frequent as age advances. That's because people that live longer remain in the labor market for a longer period and will have more time to change their professional career.

"Currently, we deem it more important that you remain true to the profession you studied than faithful to your partner. But we live in a world where changes happen and are normal. People will change their identity several times throughout their life, and this includes changes in occupation and jobs," he said.

The new scenario on the horizon imposes a more flexible university system, the minister explained, capable of preparing students to shift from one area to another, without this be-

ing seen as a sign of failure or immaturity. He questioned the current mindset that sees the withdrawal from a university course as a personal failure. "Why? Life goes on. You have to accept the idea of change. A college degree cannot dictate one's future life and need not be a definitive professional milestone."

Thinking a new model

To explain the model of the university of the future he has in mind, Janine used as an example the project of an experimental interdisciplinary humanities course that he developed for the University of São Paulo, but was never implemented.

The course was divided in four semesters, the first of which would have "Modernity" as its central theme: the disciplines would revolve around the emergence of the modern age and would discuss above all rationalism, relying on authors like Descartes, Durkheim and Max Weber. The perspective of the visual arts and literature would also be included, with analyses of novels centered on problematic heroes, such as Don Quixote and Madame Bovary, which represent "the shadow, the dark side of Modernity," he said.

The second semester would offer disciplines centered in anthropology and antiquity, and would establish a counterpoint to modernity. The third would include disciplines enabled to discuss post-modernity, focusing on contemporary thought and on critiques to modern thinkers.

According to Janine, the course was designed to offer students different views on the same subject. Sociology, for instance, is concerned with studying the flaws of modernity. Anthropology is averse to modernity, and does not believe in progress and in a hierarchy of cultures. And Political Science tends to believe that the world can be better if it becomes more rational, which is what modern thinkers assume.

"The courses would not be mere expositions of content, but different lenses through which to see social phenomena. Students would learn to analyze events from the most appropriate perspective. There is no single universal lens."

He said that, much like the university of the future, the course would broaden people's worldview. "We must become cultural and scientific polyglots; we must know the different areas and disciplines and how to integrate them," he said. □

A Theory of the Relationship between the Sleep Hormone and the Body's Defense is the Subject of Regina Markus's Conference

www.iea.usp.br/en/news/sleep-hormone

April 26, 2015

Biologist Regina Markus spoke to the participants of the Intercontinental Academia (ICA) about the relationship between melatonin, a hormone that regulates sleep, and the activation of the immune system, during the conference Stop, Stop, Stop... A Necessary Pause in the Flow of Time, held on April 26.

Markus, who is member of the IEA's scientific committee for the ICA, focused on the temporal organization of biological cycles influenced by variations of light, and particularly on the Theory of Immune-Pineal Axis, developed by her research group at the Chronopharmacology Laboratory of the Institute of Biosciences of the University of São Paulo, which she heads.

According to this theory, when attacked by a pathological agent – e.g., a virus, fungus or bacteria – and has to defend itself quickly, the body forces a temporary halt of its circadian clock, which is responsible for synchronizing internal rhythms and the external environment. During this pause, the regulation of diurnal and nocturnal biological functions becomes secondary and gives way to an innate immune response.

Markus presented a series of experiments conducted in vitro (in the controlled environment of the laboratory) and in vivo (in tissues from living organisms) in her laboratory, which show that the temporary halt of the circadian clock is possible thanks to the two-way communication that exists between the immune system and the pineal gland, located in the central re-

gion of the brain and responsible for synchronizing body rhythms and the so-called light/dark cycles.

Under normal conditions and if the body is not under threat, when night falls darkness stimulates the pineal gland to produce melatonin. The hormone, known as "hormone of darkness" or "sleep hormone," enters the bloodstream and tells every cell that it is night, paving the way for a state of drowsiness. In contrast, at dawn, the increasing intensity of light inhibits the gland and the production of melatonin ceases, allowing the body to awaken and become active for the day.

This hormonal mediation between body and mind regulates the biological clock, enabling the organism to make the necessary adjustments to maintain the 24-hour life cycles.

A pause in time

However, in the presence of an external threat, the melatonin production is altered and the fine tuning between biological rhythms and ambient light is interrupted.

To reach this conclusion, Markus hypothesized that the functions of the "hormone of darkness" go beyond regulating sleep and extend to defending the organism – or, more specifically, to acting as a blood-brain barrier (the chemical mechanism that filters what can reach the brain).

The barrier acts as a gate; when closed, it prevents leukocytes (the body's defense cells) in the bloodstream from migrating to healthy tissues and generating an undue immune response, which Markus calls "spurious inflammation."

Markus explained that melatonin is a key element in the functioning of this barrier: the hormone inhibits the permeability of the cell layer of blood vessels, preventing leukocytes from unnecessarily traversing to tissues.

However, if pineal receptors receive information that an infectious agent has entered the body, the gland blocks the synthesis of melatonin. In the absence of the hormone, the blood-brain barrier opens and allows the immune cells to pass from the bloodstream to the injured tissue. This creates the necessary conditions for the body to react quickly to the threat of a pathogen, and is the first phase of the innate immune response.

On the other hand, if melatonin levels in the blood are reduced, then the regulation of the light/dark cycles is compromised and the body cannot synchronize internal rhythms with daytime and nighttime.

According to Markus, that is why the biological clock becomes misadjusted when we are sick. "During the first stage of the immune response, the body needs to stop in time to recover. This is what happens when we have a cold and cannot sleep at night, but are sleepy during the day." □

Intercontinental Academia Conference Proposes Philosophical Reflection on Time and Eternity

www.iea.usp.br/en/news/time-eternity

April 20, 2015

In a videoconference for the Intercontinental Academia (ICA) held on April 20, Sami Pihlström, a professor of Philosophy of Religion at the University of Helsinki, addressed the notions of time and eternity from a philosophical perspective.

Pihlström, who is also director of the Helsinki Collegium for Advanced Studies, dedicated his exposition more to raising topics for reflection by the ICA participants than to providing answers. He began his lecture by raising two central philosophical problems about the metaphysics of time and of temporality: "What is time? Is time fundamentally real or is it just a way for man to categorize reality?"

According to him, these questions lead to two major concepts of time: that of Realism, which sees time as "a basic feature of the space-time universe," endowed with objective truth; and that Transcendental Idealism (developed by German philosopher Immanuel Kant), according to which time is a subjective construction of human cognitive faculties, derived from intuition.

These concepts, in turn, bring up the clash Realism vs. Anti-Realism regarding the existence of "objective and independent truth values of the mind" underlying historical statements. In Pihlström's assessment, these two philosophic currents take opposite positions: while the former states that the past is objectively determined, the latter denies the existence of objective reality in any temporal dimension.

Eternity

The second part of Pihlström exposition was devoted to reflecting on the scientific and philosophical relevance and coherence of the concept of eternity. "Is there or can there be something that is eternal?", he asked.

He observed that ancient philosophers like Plato and Aristotle held that the natural world has an eternal existence; Judeo-Christian monotheism, on the other hand, believes that the world as we know it has a beginning (the time of creation) and an end (the time of apocalypse).

However, although believing in the finitude of the world, Pihlström said, Judaism, Christianity and other religions also believe in eternal life, seen "as an endless continuation of corporeal or incorporeal existence, probably in very different form than that of earthly existence."

For him, the idea of eternal life refers us to what English philosopher Bernard Williams called the "tedium of immortality" – a state of profound dejection when faced with the infinity of time. This is because immortal beings, unencumbered by time constraints, could do anything at any time, which would lead them to postpone any action indefinitely. "There would be no motivation for anything," he emphasized.

Timelessness

On the other hand, stressed Pihlström, the concept of eternity can be interpreted not as immortal existence in infinite time, but as timelessness. In his view, "life itself can be seen as a subspecies of eternity, even if one does not believe in any kind of infinite extension of temporal existence."

He argued that, in this case, eternal life would amount to living the present moment, as proposed by the Austrian philosopher Ludwig Wittgenstein in his Tractatus Logico-Philosophicus. Unfortunately, this idea can be easily trivialized in self-help literature and popular culture," he added.

Referring to the philosophy of religion inspired by Wittgenstein's ideas, of which British philosopher Dewi Zephaniah Phillips is the leading exponent, Pihlström said religious, and particularly Christian, concern with the question of immortality/eternity begins with a radical affirmation of one's finitude and of human immortality. "Only by waiving the quest for the infinite continuity of life can one adopt the perspective of eternity that a proper ethics for life requires," he concluded. □

The Relationship between Consciousness of Self and Perception of Time

www.iea.usp.br/en/news/consciousness-self

April 25, 2015

What is the relationship between discerning the consciousness of self – in the sense of an individual's apprehension of his own existence – and the perception of time? Psychoanalyst Leopold Nosek devoted his conference on April 25 at the Intercontinental Academia to an analysis of this matter.

He said that, given the fact that consciousness of self includes temporality and that humanization presupposes perception of time, one cannot but wonder how time presents itself to, and is perceived by, human beings.

In his reasoning, Nosek made use of analogies with works by "two writers who addressed the relativity of time from within the rationalist tradition:" The Magic Mountain (1924) and Doctor Faustus (1947), both by German-born Thomas Mann (1875-1955); and The Leopard (1958), by Italian author Tomasi di Lampedusa (1896-1957).

In the passage from The Magic Mountain quoted by Nosek, Hans Castorp, the main character, has just reached the conclusion that, for the mind, time does not flow uniformly; the mind only assumes it does so to maintain the proper order of things. Therefore, all measurements of time are no more than conventions.

According to Nosek, time and consciousness of self are contemporary themes. He mentioned Freud's The Interpretation of Dreams (1900) as one of the landmarks, from the viewpoint of perception, for most texts that discuss Modernity.

He said that in this work by Freud one can see the loss of our naïve trust in the conscious mind and the inexorable breach between the conscious and the unconscious. For Nosek, we could speak of Modernity as the awareness of disruption.

Addressing the emergence of this disruption, Nosek said we must remember how brief the Renaissance actually was, "with its glorious view of the individual as part of circumstances over which he had control." However, it did not take long for Mannerism to come about, "with its distorted figures, its suffering subjectivity."

He said that art historian Arnold Hauser (1992-1978) saw Mannerism as the onset of the perception of modern man, "the perception of a shattered unity, of a broken harmony."

As for The Leopard, Nosek noted that the novel is set in the mid-19th century, the time of Italy's reunification and modernization. The main character, Don Fabrizio, prince of Salina, after a dance, realizes that he, unlike others, captures the passage of time, which is accompanied by "progress, destruction of old structures, creation of new wealth and new desolations."

According to Nosek, "the prince of Salina, in a sudden glimmer of his own skin, grasps his circumstances, his historical destiny and his subjective self; his own place is revealed to him. What more could he obtain?"

For Nosek, grappling one's circumstances and one's time blends in with the apprehension of the limits and the space of human existence: "We continue, therefore, within our theme: the interconnection between the consciousness of self, the awareness of one's 'proper place,' and the image of time defined by frustration and limitation."

In Doctor Faustus, the main character, the musician Adrian Leverkühn, makes a pact with the devil, Mephistopheles, giving his soul in exchange for 24 years of genius as a composer. Nosek noted how Mephistopheles warns the musician to pay attention to the hourglass.

For Nosek, Mephistopheles' warning means Leverkühn should remain aware of life. As a result of the pact, Lerverkühn becomes part of Modernity, "through atonal spaces, the spatial expansion of musical contradiction, accompanied by scientific inquiries and by the theory of uncertainty and chance."

He finished his presentation with some propositions by psychoanalyst Donald Meltzer (1922-2004) in his book Explorations in Autism (1975), where he organizes the space of life in a "geography of fantasy" that moves along in time.

According to Meltzer, experienced time can be a cloister where events are not available to memory and to thought (as happens in autism); it can be circular, undeveloping, where there is no death; or it can be oscillating, moving from within to outside the object and vice-versa, a continuous operation of omnipotence that makes the differentiation of self from object reversible, and also makes the direction of time itself reversible.

According to Nosek, remaining unidirectional and linear, from birth to death, requires a painful process, never completed, of renouncing the fusion between the self and the object, of struggling against narcissism, of assuaging omnipotence. □

University Presidents Discuss Changes and New Accountabilities

www.iea.usp.br/en/news/future-universities

April 24, 2015

Universities of the future will vary in their focus: some will dedicate themselves more to teaching, others to research. Interdisciplinarity will become the teaching & research paradigm. Instructors will no longer be conveyors of knowledge, but rather tutors who guide students in learning. Information and communication technologies will be intensely used. There will be greater commitment to the numerous problems faced by society.

This prospective overview summarizes the debate The Future of Universities, held on April 24 as part of the "University" program of the Intercontinental Academia.

The expositors were John Heath, pro-vice-chancellor for estates and infrastructure at the University of Birmingham (UK), Naomar de Almeida Filho, president of South-

ern Bahia Federal University (UFSB), Luiz Bevilacqua, former president of ABC Federal University (UFABC), Klaus Capelle, president of UFABC, Carlos Vogt, president of the Virtual University of the State of São Paulo (UNIVESP), and Marco Antonio Zago, president of the University of São Paulo (USP).

The panelists of the event were Helena Nader, president of the Brazilian Society for the Advancement of Science (SBPC), and Marcelo Knobel, from the Institute of Physics of the University of Campinas (UNICAMP). The event was moderated by journalist Sabine Righetti, specialized in science and technology policy, and in science journalism.

Expositions

For John Heath, digital technologies, now available to a considerable segment of the world's population, will increasingly impact the modes of learning, enabling a 24/7 approach to education and significantly affecting how research is carried out.

Heath said Birmingham already offers online classes, whereby students in the United Kingdom, United States, Hong Kong and Canada can interact, an experience they deem "transformative."

The internationalization of education, in his view, will not lead to some kind of educational colonialism. On the contrary, he believes that globalization will actually reinforce the importance of diversity and buoy up the culture of each place.

For Naomar de Almeida Filho, we should consider various possible futures for universities, because he does not believe there will be a single model. In his view, today's political, economic and social milieu makes it necessary for us to elect knowledge as society's central and main asset.

For him, contemporaneity implies certain epistemological keynotes, now that time is being cast forward into future. "One feels one is living in a 'liquid time-space' [referring to sociologist Zygmunt Baumann's concept of "liquid life," precarious and fraught with uncertainty], with enormous diversity, which also causes friction."

That is why the thought of philosopher Edgar Morin is so relevant today. For Morin, "education is the 'force of the future,' because it is one of the most powerful tools for effecting change."

Like the trivium and the quadrivium, the sets of disciplines that defined education in the Middle Ages, Almeida Filho lists five characteristics he deems fundamental to contemporary education: communication (skill in using lingua francae); connectivity; proficiency in interpretation; teaching/learning; and listening.

He said it is essential that the university be decolonized and recreated as an effective vector capable of transforming its environs.

For him, inequality in Brazil is fueled by a perverted kind of education. "Given the regressive taxation of our tax system, the State is financed by those who enjoy the least benefits. Thus, the primary and secondary education of a privileged minority is subsidized, leading them to enter the best public [and free] institutions of higher education."

As for the less privileged, "if they ever manage to overcome their difficulties and begin their higher education, they have to pay." He acknowledges that there are several mechanisms to facilitate access to university of the poorest youth – e.g., PROUNI, FIES, quotas –, "but these do not change the structure of the system."

Like Almeida Filho, Luiz Bevilacqua stressed the complexity of the transformations society is undergoing. He called our current period "a time of culture shock" and made an analogy with surfing: "A wave on the beach is, technically, a shock wave and one should not attempt to swim it; one must have an instrument (the surfboard) to ride it."

For him, "the university, in its current model, is finished and is unlikely to flourish. And there is not much time left to make the appropriate decisions."

Bevilacqua also does not believe in a single model, but rather in certain guiding principles of transformation: the university should be, above all, a place where learning prevails over teaching; where research advances knowledge instead of enlivening the résumé of the researchers (reversing the current model that emphasizes quantity over quality); and where interdisciplinarity is seen not as a cause, but as a result of the convergence of disciplines.

Klaus Capelle preferred to speak about the future from the perspective of the history of universities, listing the duties that were conferred upon them over time.

He recalled that the roots of the university lay in the academies of the philosophers of ancient Greece, and also in institutions controlled by the Church in the Middle Ages. These institutions were devoted exclusively to teaching. "The significant change took place a little over 200 years ago, when Alexander Von Humboldt, in Germany, proposed a model of autonomous university that incorporated research."

Capelle identified the 1970s as the time when the maintenance of public universities became so taxing that their members began finding it difficult to "justify their existence to the public 'merely' with the benefits of teaching and research." Thus, the tripod of university action – teaching, research and extension – was strengthened approximately 10 years ago.

"However, at present, society demands from the university not only dedication to teaching, research and extension, but also a series of other purposes, such as social inclusion, technological innovation, entrepreneurship, internationalization, distance education and sustainability."

For Capelle, too much is demanded from the university and there is too little time to achieve all that is demanded. But he believes

the university will maintain its resilience in the face of the new demands, thanks to technological development and to changes in how knowledge is organized.

In the future, he predicts some changes that were unanimous in the debate: the massive use of information and communication technologies; interdisciplinarity as a solid paradigm ("without eliminating disciplinarity"); and the specialization of institutions, because not every university can do everything.

Carlos Vogt said that society has gone from a classical culture of "formation" to one of "information" and constant "transformation." "Although we may not yet be aware, the university is already living the future, the process of permanent transformation." This process is based, he said, on the "surfboard" (mentioned earlier by Bevilacqua) of information and communication technologies.

He mentioned UNIVESP's main characteristics as an example of the use of new technologies, allowing 3,500 incoming students every year to attend one of two engineering courses (production and computation) or one of four courses leading to high-school teaching degrees (mathematics, physics, chemistry and biology).

After two years, UNIVESP's students receive a certificate of higher education. If they want an engineer's degree, they must complete three more years; a teaching degree, two more years.

As an example of using technology to educate students, Vogt mentioned the dedicated television channel UNIVESP TV and the university's YouTube channel, which has already had 30 million hits.

Following up on a comment by Capelle about the history of universities, Marco Antonio Zago said that universities were previously no more than a depository of knowledge, but the period between wars in the 20th century saw the consolidation of the model proposed by Humbolt, incorporating teaching and research.

For Zago, the missions of the university defined by Spanish philosopher Ortega Y Gasset (1885-1955) and the German thinker Karl Jaspers (1983-1969) remain valid.

He quoted an observation by Ortega y Gasset in his 1929 essay "Misión de la Universidad" on the aims of this institution: "Transmission of culture, education for the liberal professions, scientific research and the development of new men of science."

He also cited the words of Jaspers: "The university is a school – but of a very special sort. It is intended not merely as a place for instruction; rather, the student is to participate actively in research and from this experience he is to acquire the intellectual discipline and education that will remain with him throughout his life. Ideally, the student thinks independently, listens critically and is responsible to himself. He has the freedom to learn."

Zago recalled the aims of the University of São Paulo, as stated in Decree No. 6283, of 1934, which established the new institution:

a) To promote, through research, the progress of science;

b) To convey, through teaching, knowledge that enriches or develops the spirit or is useful to life;

c) To train specialists in all branches of culture, and technicians and professional personnel in all professions that require a scientific or artistic background;

d) To accomplish the social work of popularizing science, literature and the arts through synthetic courses, conferences, lectures, radio broadcasting, scientific films and the like.

For him, these goals already contained the embryo of what the university is today, when a new one has been added: the relationship between the university and society.

In his view, this new mission includes formulating proposals to solve the great problems of society, strengthening the relationship with other institutions, and concern about several

other issues, e.g., the environment, population growth and changes, food production and the portability of information services. [To demonstrate this, Zago used his cell phone to quote Ortega Y Gasset, Jaspers and the decree that created the University of São Paulo).

Zago believes one specific issue deserves an intense debate, namely, how to deal creatively with the conflict between academic quality and universal access to higher education.

The Debate

Helena Nader, one of the panelists, asked the expositors about the governance of Brazilian universities, which "is distinct from that exercised in every other country represented at the Intercontinental Academia." She also said that the autonomy of Brazilian universities "is established on paper, but doesn't exist in fact."

Regarding the diversity of universities advocated by the expositors, Nader asked whether a university that does not conduct research should be called a university.

Another aspect she highlighted is how Brazilian universities will deal with globalization, "when many models arrive here from abroad and impose themselves, including through economic pressure."

Marcelo Knobel, the other panelist, questioned the lecturers about the importance given to undergraduate education, which, in his view, "is undervalued vis-à-vis research." Secondly, he wondered what recommendation they might have to the young researchers participating in the Intercontinental Academia.

Responding to the panelists, John Heath said that higher education in Europe is a free market, with variations: "In Switzerland, it is free of charge; in the UK, it is very expensive."

As for undergraduate education, Heath chose to highlight what should be the instructors' role: "They are no longer the owners of knowledge, as the monks were in the Middle Ages; the modern role of a university professor is not to be an authority, but rather a moderator or coach."

With regard to management, Naomar de Almeida Filho said one of the dilemmas of the university is how to submit its governance to society's scrutiny. He also stated that autonomy has been often used to maintain the status quo.

He believes that we can move forward on this, as exemplified by an UFSB proposal establishing two councils: a university council, concerned with academic matters; and a strategic-social council, with representatives from the surrounding society: social movements, indigenous communities, trade unions and other organized bodies of the population.

For Vogt, the challenge is to find the balance between generality and specialization. "This cannot be done through the dissection of fields, but rather by aggregating them." For him, aggregation also involves the question of university governance, "because we have a framework that was compatible with the 1960s, but today we know that the departments have not kept up with the dynamics of groups and of academic life."

He said that in the 1990s he tried to deal with this problem at UNICAMP, but the corporatist reaction did not allow the discussion to go forward.

This challenge is associated with another one, he warned: "We must avoid the unionization of knowledge." Vogt said the rationale of trade unions is important, but it cannot override the rationale of knowledge.

On the other hand, he said that what makes universities permanent and longstanding is their conservatism, much like what happens with religious institutions: "We want change, but not to the point of a final vertigo."

On the importance of undergraduate education, he said it is key, because "you cannot prepare good researchers without preparing good undergraduate students in every field."

Capelle, answering the question about management, said that presidents of federal universities in Brazil are in a unique position: they are legitimized by their election, but are subject to internal and external constraints that prevent them from fully exercising the governance of the institution.

With regard to undergraduate education, he believes it is wrong to think of it in isolation. "The solution thought out at UFABC is to forgo the tripod of teaching, research and extension, and accept the entanglement of activities, with graduate students teaching extension courses or taking part in research, for example."

Luiz Bevilacqua said the governance of Brazilian universities is still a cultural issue and each institution has a proposal to improve it.

With regard to undergraduate education, he said the problem is that Brazil has a culture of diplomas, not of competence. "The model of colleges and technological institutions is very important and does not stanch student creativity."

He also reinforced the view of other expositors on the need for another model of student/teacher relationship, whereby learning occurs not because instructors teach students, but rather because they provide the means to learn: "You have to make students advance on their own."

Zago answered two questions from the panelists. First, regarding the profile of universities, he said it is not true that all universities should do research: "There is not enough money or resources; and this need not be so." He said research universities in the United States number no more than 100, several from the first and second echelons, but many of inferior quality.

With regard to the University of São Paulo, he said its gigantism prevents it from growing even more or from making individualized proposals to its students. As for undergraduate education, he said that it is very important, but has not been given its proper value at USP.

As a recommendation to the young researchers of the Intercontinental Academia and their task of producing a Massive Open Online Course (MOOC) about time, Zago suggested they question why they should be doing this, and for whom they are doing it (without forsaking how their work ought to be carried out), so that every interested party can benefit from the teachings about time contained in the course.

Opening the debate to other participants, biologist Eduardo Almeida, one of the young researchers of the Intercontinental Academia, asked the expositors how young professors might make a difference in the university of the future.

Marcos Nogueira Martins, professor at the Institute of Physics, asked how one should elevate to higher scientific levels the students who arrive at university with meager scientific culture.

Caio Dantas, former dean of undergraduate courses at USP and currently a researcher at the IEA, asked Naomar de Almeida Filho how it might be possible to reshape the university in very conservative regions. To Carlos Vogt, he asked how it is possible to deal with the labor union aspect of academic institutions.

Luiz Bevilacqua said there is no problem in extending the length of stay at the university of students with scant scientific culture. He added, regarding the necessary changes, that universities must learn to dialogue with members of Congress, because the military dictatorship accustomed every official to address only the executive branch of government.

Answering Caio Dantas' inquiry, Almeida Filho said that one of the agents of transformation are the public policies for social inclusion that give voice to the population, even if part of it has a conservative mindset: "The university cannot be remiss; it has a civilizing role to play."

For him, given today's massive relativism, some values have been lost and the bond between university and society is faltering. "For a university to isolate itself is gruesome. It should incorporate into the cultural milieu those who have been first, and most recently, included in the economy."

He also commented on university autonomy: "You must think differently about it. The concept of university autonomy thrived in the late 18th century, after the French Revolution, and in the early 19th century, at a time when the university had lost its social accountability."

As for the trade union activism of faculty and staff, he said that "the rupture of the dialogue between university and society opened spaces for union activism."

Carlos Vogt added that trade unionism in universities is one of the key issues, "but it is not a matter of preventing unionization, but rather of strengthening the academic rationale, of having clear academic projects."

Klaus Capelle closed the debate by answering two questions: regarding young instructors, he ascribes them a key role in universities that are in the process of consolidation; and regarding less prepared students, he emphasized that they don't always lack talent and many go on to become success stories: "We must help those whom we want in the university." □

René Nome talks about Molecular Dynamics in Short-Lived Phenomena

www.iea.usp.br/en/news/molecular-dynamics

April 20, 2015

The scientific and technological advances that have enabled us to observe molecular dynamics in real-time were discussed by René Nome in the conference Playing with Time in Chemistry, held on April 20 in the first round of expositions on the theme "Time" at the Intercontinental Academia (ICA).

Nome, a professor at the Chemistry Institute of the State University of Campinas (UNICAMP), conducts research with ultrafast spectroscopy in the field of femtochemistry, focused on the study of physicochemical phenomena that take place in very short time intervals, on the order of femtoseconds (a unit of measurement corresponding to 10-15 second – or a millionth of a billionth of a second).

In his presentation, he talked about the challenges of investigating the behavior of molecules during chemical reactions as they involve very small structures and very fast processes. He explained that, when studying this type of phenomenon, "seeing is believing" and, therefore, one must use special optical instruments, based on ultrashort laser pulses, lasting 1 femtosecond. These instruments work like photographic cameras with very high temporal resolution, and are able to capture images of extremely fleeting events, such as transition states and molecular vibration and rotation.

Forerunners

Nome emphasized that research with ultrafast spectroscopy only reached its current stage thanks to the contributions of scientists who laid down the foundation for today's techniques and technologies, especially Ahmed Zewail, Nobel Prize in Chemistry in 1999, and Eric Betzig, William Moerner and Stefan Hell, Nobel Prizes in Chemistry in 2014.

Zewail, considered the father of femtochemistry, was honored for his pioneering research studies that made it possible to observe the transition states of chemical reactions by means of femtosecond spectroscopy. The study for which he was given the Nobel Prize was highly innovative and used ultrashort laser pulses to capture images of what happens when chemical bonds break down and new ones are created. That was the birth of the world's fastest camera, capable of photographing atoms and molecules in motion over the course of a chemical reaction as if in slow motion.

Fifteen years later, Betzig, Moerner and Heel were awarded for the development of high-resolution fluorescence microscopy, which enhanced microscopy's capacity of observation to the nano scale. Previously, it was believed that maximum optical resolution was limited to half the wavelength of light. The technique developed by these researchers broke that barrier and made it possible to visualize, in real time, chemical processes within living cells and at the molecular level, giving rise to nanoscopy.

The trio's findings were the starting point for numerous studies and paved the way for us to observe the creation of synapses in nerve cells, for instance, or investigate proteins involved in diseases such as Parkinson's and Alzheimer's.

Developments

In the wake of the forerunners of femtochemistry and nanoscopy, Nome has been conducting studies in the field of ultrafast spectroscopy to understand the role of the environment in highly unpredictable physicochemical processes.

He spoke in depth about one study in particular, which observed at the molecular level the mechanisms and the transfer of energy during photosynthesis, considered one of the fastest processes ever recorded by man.

The project aims to understand how solar energy migrates from the "antenna complex" to the reaction centers where photochemistry takes place, that is, how a molecule absorbs sunlight and transfers the energy as quickly as possible to another, distant molecule. To this end, Nome uses ultrashort laser pulses, whose main advantage is its monochromatic character, indicative of a high degree of temporal coherence. In other words, the phases of the light waves are synchronized, so that photons travel together in time, in the same frequency.

According to Nome, the data obtained so far help explain the absorption efficiency of photosynthetic light and its transduction into energy. □

Carolina Escobar Highlights the Importance of Regular Biological Rhythms to Health

www.iea.usp.br/en/news/biological-rhythms

April 21, 2015

For physiologist Carolina Escobar, from the Universidad Nacional Autónoma de Mexico (UNAM), time is ingrained in humans. It is intrinsic to life.

Early on in her conference at the Intercontinental Academia on April 21 she disputed a remark made by physicist Eliezer Rabinovici during his conference on the previous day, that the reaction of prehistoric men to a sunset was panic. Escobar said that biological evolution endowed living beings with an internal clock that allows them to anticipate situations: "When the sun goes down, animals are prepared for it and know how to behave, including how to protect themselves from predators."

According to Escobar, observing the passage of time does not explain life, because the body changes constantly during the arrow of time (time's progression toward the future), and is subject to change over the course of its daily cycles – e.g., the phases of the Moon, Earth's translation around the Sun, the differences between daytime and nighttime, variations in temperature, humidity and winds, among other variables.

She exemplified this with the adjustments changes plants and animals undergo each season, mentioning how weight changes in birds depending on migratory needs, the availability of food, reproduction etc. "If animals did not have time within themselves, they would not survive."

According to her, inhabitants of higher latitudes (temperate zones and polar regions), who are susceptible to significant alterations between seasons, have a higher rate of "winter depression" than those living in the tropics. "Humans do not migrate and they pay a price for it." She stated that experiments exposing these people to more light show that this helps to abate depression.

Escobar also explained that the hormone melatonin (produced by the body only at night) regulates sleep and plays a key role in brain biochemistry, including the availability of serotonin, the neurotransmitter responsible for wakefulness.

As nights in higher latitudes are longer in wintertime, there is an increased production of melatonin, which reduces biochemical activity associated with alertness and eventually leads to anxiety and depression. The same process also triggers metabolic syndrome, inducing people to gain weight.

Escobar said there are indications that even the phases of the Moon – and, thus, the variation of night light –, affect some rhythms of the body, such as the menstrual cycle in women, which according to some evidence tends to synchronize with the 28-day Moon cycle.

Escobar believes that some of the main causes of the de-synchronization of biological rhythms in human beings are our excessive nocturnal activity and the fact that we are increasingly less exposed to nature. The consequences, she explained, are gastrointestinal diseases, mental disorders, cancer, stress, lack of concentration, obesity, anxiety and depression. A pernicious loop is thus established: "Diseases change the biological rhythms and the altered rhythms lead to disease." How regularly the eyes perceive the alternation of light and dark, of day and night, is important for the proper functioning of the brain and other organs. Escobar said that in many older people, who rarely leave home and are therefore exposed to artificial light during the day and part of the night, there are significant changes in the activation of the cycles of sleep and wakefulness. According to her, when exposed to additional lighting during the day, these seniors begin to sleep better and become more active.

The importance of living in consonance with the light/dark cycle of days and nights for our organism's proper development was demonstrated by an experiment that Escobar's team carried out in the neonatal intensive care unit of a Mexican hospital. Part of the premature babies had their heads partially covered with a dome during the night, so that their eyes received less light, since the ICU is fully lighted 24/7. Babies who slept under the dome gained weight faster and left the ICU earlier that those who did not. □

Conception of time in different societies

www.iea.usp.br/en/news/conception-time

April 22, 2015

What people understand by time is present in all languages, and how they experience time is linked to this concept. Based on this reasoning, Professor Karl-Heinz Kohl, Director of the Frobenius Institute, gave his conference at the Intercontinental Academia (ICA) on April 22.

According to him, the way how different societies interpret time strongly depends on their mode of production and on the environment in which they live. "People from irrigation and hunting cultures had a different conception of time than industrial societies, as demonstrated in the film 'Modern Times', which is almost a hundred years old. The slaves of time in industrial society are connected to modernity," he said.

For the professor, one can find similarities between conceptions of time for people living away from each other and that have never met before, while people living nearby may have different notions of time.

According to Kohl, the concept of time for anthropology is connected to Charles Darwin's theory of evolution. Anthropologists have created a kind of progress line and put each society in a certain position. People like the Australian aborigines, the inhabitants of Tierra del Fuego, as well as Polynesian and American Indians would be classified in the last stage of this line, while the French and the Anglo-Saxons would be at the top. In this concept, the more time goes on, the more species prosper and reach their goal of perfection and happiness - something quite connected to the capitalist economy.

Kohl cited the different conceptions of time of several people, such as Egyptians, Greeks, Babylonians and several African tribes. He also related the time in some religions, such as Christianity, Hinduism and Buddhism.

Another example of how time has affected the life of societies, according to Kohl, was brought by the expansion of the railway in the United States in the last two decades of the nineteenth century. At that time, each American city had its own time according to the passage of the sun. But because of the arrival of trains, it has been necessary to adopt the time zones and thus to standardize the measurement of time in all cities. The professor explained that people born during the transition to the fully industrialized mode of production became obsessed with the concept of time and progress - the beginning of the "clock empire", as pointed by Kohl. One of the rites of passage to adulthood in this period was to give a pocket watch to young people, an object that has become a synonymous of industrialization and prosperity. □

Goldemberg Talks about USP's Contributions to Society

www.iea.usp.br/en/news/goldemberg-talk

April 20, 2015

Physicist José Goldemberg, former president of the University of São Paulo and former minister of Education, was the first speaker at the Intercontinental Academia (ICA) on the morning of April 20. He talked about the history of the university, its role in international education and research, and the challenges thrust upon it.

The conference was part of the ICA's complementary program to discuss the future of universities.

Goldemberg recalled that universities came late in Brazil, partly because of restrictions imposed by the Portuguese Crown in the colonial period. He added that, unlike other centenary universities that have developed naturally, the University of São Paulo was built according to a plan, at a time when industrialization was thriving and there was a need to restructure the educational system and to expand the supply of skilled labor.

According to him, the creation of USP in 1934 benefited from the fact that numerous European intellectuals were dissatisfied with the political direction their continent was taking. "They were persuaded to come and take part in establishing the university, which began with the existing schools of Law, Medicine and Engineering, and grew with the addition of other colleges."

For Goldemberg, two facts were particularly relevant to the success of the initiative: the adoption of a full-time professorship regime and the total funding of the university by the state government.

80 years

In 2014, Goldemberg chaired the committee in charge of the celebrations of USP's 80th anniversary. One of his tasks was to organize a book on the occasion and, toward this end, a questionnaire was sent to 52 directors of education and research units, specialized institutes, and museums. One of the questions inquired what the unit had done throughout its history as a contribution to society.

Goldemberg said some of these officers didn't know how to answer the question. To him, this shows how much the role of the university remains undefined for a large number of scholars.

He said the University of São Paulo consumes 5% of state taxes, equivalent to approximately US$ 2 billion, and that the average student costs US$ 2,000 per month. "Even if there are many excellent courses and others not so good, regardless of the resources invested," he considers that a wholly State-funded university might be a good template for developing countries.

With regard to international comparisons, Goldemberg relied on the Times Higher Education ranking, where USP appears among the 201-225 best-rated institutions. He agreed that this position is not extraordinary, but "considering the number of countries with higher ranking universities than USP, we find that there are 150 countries in the world that do not have a similar university, and this says a lot."

For him, USP's ranking shows that the university has the ability to educate well-informed individuals about the world and which technologies are being tested or need to be developed.

Goldemberg exemplified this with the pursuits of certain schools, such as ethanol research headed by Luiz de Queiroz Agricultural College (ESALQ), in Piracicaba, "which made it possible for half the gasoline Brazil needs today to be replaced by sugarcane ethanol."

During his exposition, Goldemberg displayed graphs of Brazil's and USP's scientific production, and concluded that the number of papers published abroad has increased. "This could be an excellent growth indicator of our output; however, the impact of the articles is still low, a little over 0.6 for Brazil and 0.7 for USP if we take '1' as an international average" [being the number of citations an article receives].

He recalled that in addition to the contributions to applied natural sciences and engineering, one must also highlight a number of other relevant contributions to society that are not properly computed in the ratings. He mentioned as an example the contributions of Law School professors, which have become reference in many trials and legal opinions, and played a decisive role in drafting proposals that turned into laws, such as the Consumer Protection Code (Law No. 8078/90).

Another outstanding feature of the University of São Paulo, in his view, is the role of numerous professors in political, institutional and social activities, such as the creation of political parties, work in the first echelon of federal, state and municipal governments (even as head of the Executive branch), and special initiatives, such as the Truth Commission that aims to elucidate crimes committed by the military dictatorship.

At the end of his exposition, Goldemberg made an analogy between the ICA's interdisciplinary and interactive academic proposal, and the role of the IEA, created during his tenure as USP's president: "The IEA was created to stimulate interaction between the various groups of the university, in all scientific areas."

Debate

During the ensuing debate, biologist Eduardo Almeida, one of the young participant scholars, asked Goldemberg if by taking part in projects such as the ICA (which are interdisciplinary and difficult to assess by the usual evaluation procedures) young scholars might not be swimming against the current and producing less than they might in their area of research. Goldemberg's answer was succinct and to the point: "I don't agree. Being in contact with scholars from other fields leads to greater creativity in one's own area."

Asked by physiologist Carolina Escobar which strategy could be adopted to encourage low-production professors to produce more, Goldemberg said that usually administrative statutes do not allow their dismissal and that, therefore, it is up to department heads to be more active in demanding productivity.

To a question from statistician Caio Dantas, former dean of Undergraduate Studies at USP and currently a researcher at the IEA, on how to evaluate scholars who don't have a significant production paper but are very active in stimulating the work of research groups and the development of students, Goldemberg said that one of the ways might be the institution of awards, as occurs in other areas of knowledge, such as the arts.

Martin Grossmann, director of the IEA, asked what Goldemberg would recommend to young researchers participating in the ICA. The answer came in one word: "Aggressiveness". □

Conference Addresses Cross-Cultural Artistic Experience between Brazilians, Yanomamis and Germans

www.iea.usp.br/en/news/cross-cultural

April 20, 2015

The process of the artistic creation of the multimedia opera Amazonas: Music Theatre in Three Parts was expounded by Laymert Garcia dos Santos in the conference Myth and Technoscience in Cross-Cultural Amazonia, held on April 20 as part of the program of the Intercontinental Academia (ICA)

The opera is the result of an international and cross-cultural cooperation effort involving Brazilian researchers, German artists and Yanomami Indians from the Watoriki settlement, on the border with Venezuela, and chronicles the future of the Amazon forest both from a Western, technoscientific perspective and from a shamanic, mythological viewpoint.

According to Santos, a professor at the Sociology Department of the State University of Campinas (UNICAMP), the aim of this artistic experiment was to bring together two distinct visions of the future of the Amazon rainforest – one based on magical thinking, the other on rational thought – and find common ground on which produce the piece. The opera was produced from 2006 to 2010 in a partnership between the Goethe Institute, the Munich Biennale, the ZKM Center for Art and Media in Karlsruhe, and the Hutukara Yanomami Association, and was presented in 2010 at the International Festival for New Music Theatre of the Munich Biennale and at SESC Pompéia, São Paulo, and in 2013 at the Out of Control Festival in Vienna (Austria).

To achieve this synthesis between shamanic and technoscientific cosmologies, a cross-cultural dialogue was established between the Indians and the "white man," based on a symmetrical relationship and mutual respect. "It was necessary that the two visions converse and preserve their essence, without one submitting to the other. The idea was to integrate, not erase the differences between them," he said.

The speaker compared the process of creating the opera to that of establishing the ICA. According to him, both initiatives involve bringing together players from different cultures and integrating their cosmologies, perspectives and worldviews towards a common goal. "It is not a matter of overcoming misunderstandings, but of turning them into productive misunderstandings," he said, paraphrasing the French anthropologist Bruce Albert.

The choice of a multimedia and cross-cultural opera was a wager that emotions might help raise society's awareness of the problem of deforestation in the Amazon region. The focus, Santos insisted, was to address the issue through art, using the unconventional strategy of appealing to reason by means of technoscientific information, generally restricted to data, numbers and graphs. "We wanted to reflect why, even though we know we must stop deforestation, we do not."

The opera

Exhibiting excerpts from the opera, Santos explained each of its three parts. The first, "Tilt," was inspired by the letter Walter Raleigh wrote to Queen Elizabeth I, in which the explorer recounts his expedition to the Orinoco River region, near the territory of the Yanomami in Venezuela, and claims to have discovered the legendary place the Spanish called "El Dorado."

With a soundtrack of urban noises, this introductory section refers us to the past, more specifically to the perspective of the first discoverers of America. But it takes place in the future, at a time when the forest has been totally devastated and no longer exists. According to Santos, "Tilt" shows that the future of the forest was sealed in the distant past, with the arrival of the Europeans. The "white man," embodied in Raleigh, would be the spokesman for the coming destruction.

"The Sky Is About to Fall," the second part of the opera, deals with the future of the forest from the mythical perspective of the Yanomami. Pervaded by indigenous chants and natural sounds heard in the woods, the narrative depicts the triumph of Xawara – the evil spirit that symbolizes the "white man's" greed – over the shamans. The outcome of the clash results in the apocalypse, which Yanomami mythology refers to as "the fall of heaven."

The last part, "Amazonas Conference," is divided into three scenes: 1) "Paradise," which uses mathematical data and models to explore the biochemical processes that ensure the equilibrium of ecosystems and biodiversity at the molecular level; 2) "Conference," where scientists, politicians, shamans and economists discuss the future of the forest and reach the conclusion that it's too late to stop the devastation; and 3) "Entropy", which tells of the collapse of paradise, as announced by the Yanomami and by westerners, with the destruction of molecular chains essential to nature's life cycles, and of the resulting destruction of the forest.

In Santos' assessment, the opera reveals that, although modeled on very different types of logic, shamanic cosmology and technoscientific rationality are in agreement about the future of the forest: given the current rate of deforestation, the end is inevitable. "This is a death foretold," he noted. □

Scientific & Cultural Tour Reveals Aspects of São Paulo's Social Inequality and Interculturalism to ICA Participants

www.iea.usp.br/en/news/tour-saopaulo1

April 19, 2015

The contrasts between the central region and the outskirts of the city of São Paulo were made clear to the participants of the Intercontinental Academia (ICA) who took the scientific and cultural tour "Centralities peripheries" on April 19. The tour also included an exposition on the relationship between migration flows and interculturality in São Paulo.

The tour began downtown, at the Pateo do Collegio, São Paulo's founding landmark, continued at USP's Law School in São Francisco Square and the Sé Cathedral. In the second part, participants visited some of the surrounding areas and learned a little about specific features of the Pacaembu and Canindé neighborhoods, where they visited the Kantuta Square. The itinerary of the third part included the outskirts – or "periphery" as it's more commonly called – and, specifically, the Vila Medeiros district, in the North Zone, with a lunch stop at the Mocotó restaurant. Participants also visited USP Leste (the East Zone campus of the University of São Paulo), in Jardim Matarazzo, and the Nutritional Education and Recovery Center (CREN) in Vila Jacuí.

The tour was hosted by Sylvia Dantas, coordinator of IEA's Intercultural Dialogues research group and professor at UNIFESP; Ana Lydia Sawaya, coordinator of IEA's Nutrition and Poverty research group and professor at UNIFESP as well; Fernando Aith, councilor for the UNESCO Chair on Education for Peace, Human Rights, Democracy and Tolerance (based at the IEA) and professor at USP's Medical School; and Suzana Pasternak, professor at USP's School of Architecture and Urbanism (FAU).

Interculturality

Dantas explained that São Paulo was built with the help of immigrants from all over the world, especially those of Japanese and Italian descent, who arrived in the first half of the 20th century to meet the demand for agricultural and industrial labor, and who exerted great influence in the city's cultural milieu.

According to her, in recent decades the city has been experiencing new immigration flows, particularly of Bolivians, who already number more than 300,000. Attracted by the growth of the Brazilian economy, these immigrants come to São Paulo in search of jobs and a better life. Many of them are in the country illegally and are submitted to degrading working conditions, low pay and exhausting work in clothing sweatshops in the Bom Retiro and Brás districts.

The ICA participants had the opportunity to learn more about the universe of these immigrants in Kantuta Square, where a Bolivian street market attracts nearly 3,000 people every Sunday to enjoy typical foods, crafts, folklore and dances from different regions of Bolivia. Rodrigo González, vice-president of the Padre Bento Bolivian Gastronomic, Cultural and Folklore Association, which organizes the market, spoke to the researchers about the importance of the weekly event to pass on Bolivian culture to newer generations, already born in Brazil, and to promote cultural exchanges with Brazilians and with other Latin American immigrants.

The lawful city vs. the unlawful city

As they passed through the Pacaembu neighborhood, Martin Grossmann, IEA's director, explained the architectural plan of the region. Based on the "garden city" concept, the project was inspired by British architecture of the Victorian era and sought to respect the natural topography, resulting in sinuous streets and houses with large lots and ample gardens.

Grossmann noted that this type of urban development, in a neighborhood reserved for São Paulo's elite, contrasts with the precarious housing in the city center, where drug addicts and the homeless sleep on sidewalks or squat empty buildings, resisting the movement to expel low-income residents from downtown.

Aith stressed that the contrast is one of the effects of São Paulo's accelerated growth, especially since the 1950s. Over this period, the process of uncontrolled urbanization was intensified, with a chaotic occupation of urban spaces splitting the city in two different worlds: a "lawful" city, benefitted with urban planning, regular housing and public services such as transport, water mains, electricity, schools and hospitals; and an "unlawful" city, always growing towards the periphery, in the midst of great poverty, giving rise to slums and to all kinds of substandard housing.

According to the councilor, in the lawful city, the difficulty of having access to regular housing, derived from São Paulo's deep socioeconomic inequalities, pushes the poor to ever more distant places, with inadequate adequate transportation, health, sanitation and educational infrastructure.

In these remote areas, the people occupy land that belongs to others (private owners or the State) and embark on "self-constructions" – houses made of cheap material and built with the labor of friends and neighbors. Aith stressed that only when these illegal occupations are already at an advanced, irreversible stage does the State take action to "legalize" them by means of redevelopment projects.

The periphery

The transition between the lawful city and the unlawful city was observed as the tour advanced towards the outskirts. In Vila Medeiros, the ICA researchers found an example of an urbanized suburb, an entire neighborhood that had actually begun as an irregular occupation. In the vicinity of USP Leste, they saw ramshackle houses built inside an ecological park, where construction is supposedly forbidden by environmental laws.

The group obtained a more detailed picture of living conditions in the periphery from Sawaya's exposition on the work of the CREN in Vila Jacuí, a neighborhood that emerged from the illegal occupation of an area of foun-

tainheads that is part of an ecological reserve.

Although it has been "reurbanized," Vila Jacuí still lacks public infrastructure and services, and is overwhelmed by drug trafficking. With one of the lowest Human Development Index (HDI) in São Paulo's East Zone, the district's CREN is one of the few instruments to improve the population's quality of life.

The CREN operates there since 1993, combating and preventing both malnutrition and obesity in children and adolescents, offering nutritional assessment programs, development and learning evaluation, treatment for infections, education, and insertion into the world of culture. To these ends, it has a day hospital that treats nearly 100 children, offering them five balanced meals a day.

Besides contributing to the nutritional and educational recovery of children and adolescents, the CREN is also a place for family gatherings and the practice of different activities. Computers are available to the community, as well as a fully equipped playroom and the infrastructure for physical and cultural activities (music, theater, dance and sports).

Sawaya, who is former coordinator and current scientific director of the CREN, stressed the importance of the project as an initiative to develop youth participation and provide opportunities for children and young people to move away from crime. According to her, of the people who attend the center, 60% have a family member in prison and 70% have a relative addicted to drugs or alcohol.

She also pointed out that over its 23 years of operation, the project has helped 3 million children and contributed to substantially reduce the number of murders in the environs. □

Opening of the Intercontinental Academia Highlights the Project's Uniqueness and Relevance

www.iea.usp.br/en/news/opening-ica

April 17, 2015

The opening session of the Intercontinental Academia (ICA), which took place on the evening of April 17 at USP's Medical School, was marked by the enthusiasm of all those present for the uniqueness of the project and its importance for scientific and cultural cooperation between scholars from different countries, institutions and fields of knowledge.

The then Minister of Education, Renato Janine Ribeiro, who is a member of IEA's Scientific Committee in the project, stressed the significance of this initiative to integrate people with various cultural and academic backgrounds at a time when words like "knowledge" and "wisdom" have acquires various meanings and when "there are so many doubts about what to do with knowledge, and wisdom is no longer a constant in science."

The president of the National Council for Scientific and Technological Development (CNPq), Hernan Chaimovich, who is also a member of IEA's Scientific Committee, said that the ICA is an example of "non canonical" activity that must play a greater role in the training of scholars: "The choice of one subject to be analyzed by people from different cultures and backgrounds has an extremely rich intellectual relevance; it is an example of how to overcome interdisciplinarity and achieve an academically competitive transculturality anywhere in the world." Chaimovich also stressed the quality of the scientific profile of the young scholars selected for the project.

USP's dean of Research, José Eduardo Krieger, represented the president of the university, Marco Antonio Zago, at the ceremony. Krieger, who is chairman of IEA's Scientific Committee, said the project contributes to leverage the most productive formats of scientific collaboration networks. He also drew attention to the fact that the ICA is characterized by interdisciplinarity and the integration of young researchers, "who will play an important role in the society of their home countries."

The director of the IEA, Martin Grossmann, presented the history and characteristics of the project, explaining that side by side with reflections on the concepts of time in various sciences, other activities and discussion topics were also included, such as a discussion on the future of the university and the development of a MOOC (Massive Open Online Course), a free course about time to be offered via the Web.

Carsten Dose, from the Institute of Advanced Studies of the University of Freiburg (Germany), general secretary of the project, congratulated all participants on behalf of all the institutes for advanced study that comprise the UBIAS network (University-Based Institutes for Advanced Study), ICA's mother organization. He said the materialization of the proposal that emerged in 2012 is a clear demonstration of how UBIAS' member institutes can work together. Dose also paid tribute to the former director of the IEA, César Ades (1943-2012), who attended the meeting that established UBIAS in October 2010 and impressed everyone with his enthusiasm for the new entity.

Dapeng Cai, from the Institute for Advanced Research (IAR) of Nagoya University (Japan), the partner of the IEA in the implementation of the ICA, highlighted the efforts to bring about this project and the importance of the final product being a MOOC on time. In his view, the creation of a MOOC shows that the ICA, in addition to enabling the sharing of knowledge among all scholars involved, is also concerned with sharing results with the public at large. □

Participants of the Intercontinental Academia Become Acquainted with São Paulo's Cultural and Scientific Multifariousness

www.iea.usp.br/en/news/usp-city

April 18, 2015

The relationship between the University of São Paulo and the city of São Paulo, the buildings and monuments that display the myriad architectural influences in the state capital, and an overview of the city's social, economic and cultural history were presented to the participants of the Intercontinental Academia (ICA) on April 18, during the project's first activity.

The activity comprised a 10-hour cultural and scientific tour downtown and in some neighborhoods of São Paulo. The tour was organized and expounded by IEA's director, Martin Grossmann, together with the Institute's deputy director, Paulo Saldiva, the director of the Museum of Contemporary Art (MAC), Hugo Segawa, and professors Eduardo Monteiro and Fernando Iazetta, from the Music Department of the School of Communication and Arts (ECA), both accompanied by members of projects they coordinate.

The participants were able to get a good feel of the history of São Paulo and its people since the founding of the city, with special emphasis on the growth and development brought about by the great age of coffee and the subsequent industrialization. The tour was based on the Giro Cultural project, designed by the Dean's Office for Culture and University Extension (PRCEU) and coordinated by Grossmann.

The itinerary included Independence Park, the Paulista Museum, the Monument to the Independence and the Museum of Zoology, all in Ipiranga district; Dom Pedro II Park, including the Palace of the Industries and the Municipal Market; the city center, including São João and Ipiranga avenues, Republic Square, the former premises of Caetano de Campos school, the Municipal Theater, the Copan building, the building of the School of Architecture and Urbanism in Maranhão street and the Maria Antonia University Center; the building of USP's Medical School; Paulista Avenue; and the seat of the Museum of Contemporary Art in Ibirapuera Park.

Grossmann explained how much the city was influenced, until the early decades of the 20th century, by the architecture of 19th century European palaces (the Paulista Museum and the Municipal Theater, for example), and how it later moved on to incorporate modernist values with the projects of Oscar Niemeyer, Lina Bo Bardi, Paulo Mendes da Rocha and other architects. The history of how the city was established and the collections of São Paulo's major museums (MASP, MAM, MAC and Pinacoteca) were the object of detailed explanations by Grossmann, who also spoke about the creation of the São Paulo Biennial in 1951.

During the visit to the Maria Antonia University Center, the participants were informed of the importance of the site as the former seat of USP's School of Philosophy, Literature and Human Sciences, and as a one of the nuclei of resistance to the military dictatorship. They had the opportunity to hear an exposition by Eduardo Monteiro on the life and work São Paulo-born composer Alexandre Levy (1864-1892). Monteiro heads the Piano Laboratory of ECA's Music Department, where he oversees a project to record all of Levy's works. Monteiro's talk was followed by the presentation of four of Levy's pieces, performed by graduate and undergraduate students involved in the project.

At the Medical School, Paul Saldiva explained the School's role in the development of medical research in Brazil and the importance of the Clinical Hospital for providing health services to the city's population. Saldiva also mentioned the perils to health and life in general in the daily life of a metropolis such as São Paulo – from the numerous motorcycle accidents to environmental hazards such as air pollution and sanitation problems.

At the Museum of Contemporary Art, Hugo Segawa talked about the features and role of the institution within the University of São Paulo, the city's cultural milieu, and the move three years ago to the building designed by Oscar Niemeyer. On the terrace on the eighth floor of the museum, the guests enjoyed a panoramic view of Ibirapuera Park and of the southern and western regions of the city, accompanied by explanations by Segawa, whose scholarly pursuits at the School of Architecture and Urbanism (FAU) include the history of natural landscapes, public spaces and public urban gardens.

Also at MAC, participants listened to a performance by NuSom group. This group, from ECA's Music Department, is dedicated to researches in sonology [the multidisciplinary study of sound]. Two pieces with audiovisual interaction and electronic resources were presented, and the group's coordinator explained how they integrate various artistic and technological fields.

On balance, the activity was extremely positive, enabling the first close contact between the ICA participants. During lunch, at an Italian restaurant (after the influence of Italian immigration in the city had been explained), one could already sense the closeness and the exchange of information: one young biologist, for instance, was soon discussing with a young mathematician, his table neighbor, about an idea he had had that involved biomathematics. □

This graphic object on the Intercontinental Academia is a *sui generis* publication, not identifiable with any of the printed material usually put out by academic institutions. It is the result of experimentation by artists who use paper as a platform for unconventional narratives and seeks to give different treatment to the content originally published in the IEA-USP's website (*www.iea.usp.br*), and in this case in the Intercontinental Academia's website (*intercontinental-academia.ubias.net*). Thus, a two-way street is established, where what's digital and what's not digital interact and complement each other. In addition to this one, two other unidentified graphic objects were launched by the IEA-USP between 2014 and 2016.

March 2012 The proposal to create a worldwide and interdisciplinary academic programme to foster the encounter of young talented researchers was one of the main outcomes of the meeting of the Steering Committee of the UBIAS (University-Based Institutes for Advanced Studies) network, held at the Jawaharlal Nehru University's Institute of Advanced Study (JNIAS), in New Delhi. The University of Sao Paulo's IEA and the Nagoya University's Institute for Advanced Research (IAR), with the support of the University of Freiburg's Institute for Advanced Studies (FRIAS), have decided to lead the pilot project for this initiative, naming it Intercontinental Academia.

September 2013 During the UBIAS network conference held at the University of British Columbia, in Vancouver, the project was presented and discussed by all the participants. A letter of intent was signed by the directors of the IAR and the IEA, officially announcing the first edition of the Intercontinental Academia, planned to take place in Sao Paulo in April 2015 and in Nagoya in March 2016. "Time" was chosen as the theme of the first edition.

September 2014 At the FRIAS, in Freiburg, 15 young researchers have been selected based on the analysis of their CVs and letters of intent, considering three main guidelines: quality and singularity of individual research, interdisciplinarity, and cultural and geographical variety. At this same occasion, the Senior Committee decided that the final product of the Intercontinental Academia would be a Massive Open Online Course (MOOC) on the subject "Time" to be produced by the young researchers with the support of the UBIAS network.

April 2015 During 14 days, 13 young (2 could not join) and 40 senior researchers gathered at the IEA in Sao Paulo, taking part in the first phase of the project. They had the chance to discuss topics concerning the central theme through lectures, workshops and debates aiming the development of a MOOC. In this immersive and intensive programme, they have also shared experiences and participated in intercultural activities. As a final result of the encounter, the young researchers presented the structure and the strategy for the development of the MOOC.

March 2016 Following a similar structure of the immersive programme developed in Sao Paulo, the IAR is structuring the second phase of the project in Nagoya considering three main guidelines: the MOOC proposal, launched by the 13 young researchers in April 2015, the IAR's own perspective on "Time", and contextual experiences related to science and culture in Japan. With the support of Waseda University, the group and the senior committee of the Intercontinental Academia will also visit Tokyo and participate in academic activities at this university. As a final result of this meeting, the young researchers should present all the scripts of the lectures to be produced for the MOOC.

April to December 2016 Production of the MOOC on "Time" by the 13 young researchers in association with Coursera and the assistance of the IAS_Institutes of Advanced Studies, IT and media structures of the Universities involved in this first edition.