Growth and Development

- ARE 14 DAYS ENOUGH? Time cutoff in human embryonic research » p. 10
- SPRING FEVER Hormones on the brain in the season of life » p. 4
- WINTER BLUES ...or spring blues? Seasonal affective disorder » p. 16
Spring is springing! You know what that means (see the comic on page 8 if you don’t actually know what this means). Berliners are cautiously stepping out of their dark clubs and laboratories for coffees in the sun. Hormones are going crazy (page 4) and for some of us, it’s that time of year again when our migraines get worse (or is it? page 9). For others, it can mean welcome respite from the icy grip of Seasonal Affective Disorder. The personal narrative (not to mention the great illustration!) on page 16 gives our readers a glimpse of what it’s like and signs to look for that you may have more than just the winter blues.

Spring also means growth, and we’re all about that. If you feel like growing up isn’t all it’s cracked up to be then — yup — there’s a comic for that too, on page 13. We know you love petri dishes so we tackle myths about stem cells (page 6) and our former Editor in Chief gives you the story behind the two-week restriction on embryonic research (page 11). Hint: it involves non-scientists getting all up in our business. Sometimes the truth hurts: you ain’t gettin’ any younger (page 18) and a bigger brain may not mean better brain (page 14). And sometimes the truth stinks (page 15).

Our Career section, as usual, has coverage of career events (page 24), student perspectives (page 20), interviews with researchers (page 22) and of course career advice from Dr. Brown (page 21). In the Campus Section you will find reviews of books and TV series (pages 25-27, 30 and 34). Spring traditions from around the world (page 28), coverage of this year’s Chaos Communication Congress (page 32) and news from around campus (page 31).

As you may know, Constance Holman has stepped down from her position as Editor in Chief after the last edition to become a scientist and writer extraordinaire. She left some really big shoes to fill, so now there are three of us: Bettina Schmerl (A.G. Shoichet), Ioana Weber (AG Tarabykin) and Alex Masurovsky (who is just a lowly master’s student). Ioana also took on the mammoth task of revamping our entire layout, including the colorblind-friendly section headers and pretty much all of the illustrations.

There’s lots to read. Get growing!

Bettina Schmerl
Alex Masurovsky
Ioana Weber
Co-editors in chief

Like what you see?
Interested in contributing? We are always looking for new authors and submission on anything related to the topic of neuroscience. Send us an article, some beautiful shots from your microscope, poems, short stories, critiques, reviews, anything! The best contribution will be rewarded with the book *The Future of the Brain* edited by Gary Marcus.

Come on and write like there’s no tomorrow! Send your contribution to cns-newsletter@charite.de to win.

This issue’s winner is P.S. Nandini, who wrote an engaging and fun article about hormonal changes in the spring.

Congratulations, and thanks to everybody for their contributions!
**CONTENTS**

### FOCUS

**Hormones Gone Wild**  
Are you a different person in spring?...

**Adult Neural Stem Cells**  
Fact or Fiction?...

**Seasonal Aspects Of Migraines**

**The Longest Two Weeks**  
Time cutoff in human embryonic research...

**Bigger Brain, Smarter Brain?**  
The pitfalls of macrocephaly and megalencephaly...

**The Truth Stinks**  
Will aromatherapy really help you?...

**Spry In Summer, Weedy In Winter**  
seasonal affective disorder(s)...

**Life of Brain**  
Cerebral changes during the life span...

### CAREER

**Be a Young Einstein!**  
The first Einstein PhD Cohort...

**Column: Dr Brown**  
Transferable academic skills: Handling high information density...

**Researcher Profile**  
Dr Luke Tudge...

**The Career Exploration Day**

### CAMPUS

**Netflix’s "Maniac":**  
a review...

**Book Review: "The Ultimate Cure"**

**Spring Traditions Around The World**

**A Neuro-Atypical Teen-age Romance**  
Review of "Atypical"...

**The NEUBIAS Training Schools and Symposiums**

**News in Brief**

**Congress Report: 35C3**

**The Month of Madness**  
Review of "Brain on Fire"...

**WhazzUp?**  
Events in and around Berlin...
One morning you wake up to find powdery white snow drifting down daintily to cover your window sill. “How pretty!”, you exclaim. Progressively, your days begin to consist exclusively of bleak grey skies and people milling about in dark black coats, holding dark umbrellas to shield themselves from the grey sheaths of pouring rain. At one point, this winter palette of white, grey and black starts to get on your nerves. You lament the unending darkness, and nearly end up composing lengthy poems expressing all the fine details of your sadness. That’s when spring enters in all its colourful glory. Aslan has broken the White Witch’s spell once again! Suddenly there’s so much powder blue, lime green, buttercup yellow, orange and brown to feast your eyes on. And the sun’s finally out, giving everything a nice shiny golden outline. All this extra sunlight, warmth and colour brings a lightness to your step, a spark in your eyes and a warmth in your heart. But it isn’t just an uplifting of your mood. Your body tweaks its hormones to give you this extra boost. Does this increased exposure to a wider range of colours, warmth and sunlight in spring have any effect on our hormonal levels?

### Spring Colours and Your Hormones

The photopigments in your eyes transmit two kinds of information. While the red, green and blue opsins in the cones, and rhodopsin in the rods transmit image-forming information via the lateral geniculate nucleus to the visual cortex, the more recently discovered melanopsins transmit non-image-forming information to the hypothalamus via the SCN. In mice, exposure to blue light led to elevated plasma corticosterone levels (stress hormones that lead to arousal and wakefulness), while exposure to green light led to decrease in corticosterone levels. Melanopsin relays photic information to the SCN which then directs the adrenal gland to adjust its corticosterone secretion levels according to the wavelength the mouse is encountering [1]. Spectral analysis of daylight shows that the relative contribution of blue light to overall light exposure in humans is greater in spring compared to winters. In humans, blue light causes twice the amount of melatonin suppression compared to green light [2], explaining increased arousal in spring.

Interestingly, hormones are also the reason why you get to enjoy the beauty of colours. Last year, when a group of researchers grew human retinal organoids from patient-derived stem cells, they observed that the thyroid hormones (T4 and T3) specify the development of the three types of cones containing the different opsins in the retina [3]. During development, the retina locally controls the temporal availability of TH using TH degrading and activating hormones, ensuring low levels of TH in the earlier stages, to determine the blue opsin cone cell fate, followed by higher levels of TH later in development to allow the formation of green and red opsin-containing cones. Initially the influence of thyroid hormone on the production of cones was thought to be limited to the developmental period. However, a group of researchers at the Max Planck Institute for Brain Research, Frankfurt showed that when they induced hypothyroidism in mice and rats, all cones switched to the production of blue opsin, and reduced the production of green opsin. When the thyroid hormone levels were brought back to normality again, the cone cells reverted to producing their regular opsins-- one type made blue and the other green [4].
Although this dynamic change in opsin production hasn’t been observed in humans yet, there’s a chance that it’s conserved across all mammals. Levels of thyroid stimulating hormone in humans have been observed to fall in winter, and increase in summer and fall. Seasonal changes in our thyroid hormone levels could then take up a whole new significance with respect to how we perceive different colours in different seasons. What you see as yellow in summer is different from what you consider yellow in winter. Human colour perception has been observed to vary between seasons. When participants were asked to set light to yellow, they observed that in summer there was a shift in universal yellow settings to shorter wavelengths compared to winter, consistent with a model which takes into consideration season reweighing of green and red opsin activity [5].

**Savour Those Serotoninins!**
The general feeling of well-being and happiness in spring is attributable to increased serotonin turnover in the brain, compared to fall and winter. Its rate of production is directly related to luminosity and duration of the day. Serotonin also has an impact on learning and memory. Tasks requiring extended working memory are easier to perform in winter and autumn, while those requiring sustained attention are done better in spring and summer [6].

Serotonin levels in blood and CSF show a corresponding peak in spring and summer. PET scans have also revealed diurnal variations in the levels of serotonin receptors and transporters according to the level of sunlight, in the frontal cortex, insular cortex, amygdala, hippocampus and thalamus. The cortex has a higher availability of the serotonin receptors on days with longer periods of sunlight, while there’s a decrease in serotonin transporters across the day in the midbrain [7]. Apart from influencing what you feel like eating, and when you feel like sleeping, serotonin also impacts cognition and emotion by modulating synaptic plasticity.

**Spring in the Animal Kingdom**
Our body adapts to changes in photoperiod mainly via melatonin, which is also quite sinisterly alluded to as the ‘hormone of darkness’. When the melanopsin-containing retinal cells sense more day light, they signal to the SCN, which then directs the pineal gland to decrease melatonin production. Melatonin regulates the synthesis of various hormones, and also modifies your immune responses in response to changing seasons. In lower vertebrates, the pineal gland is photosensitive. In mammalian brains, it has lost its photosensitivity, but shows a circadian oscillation, subject to input from the SCN.

Annual changes in photoperiod can also directly affect organs. In zebrafish, light was observed to directly act on cultured peripheral organs like heart and kidneys and set the circadian rhythm in these cells [10]. Lampreys (a jawless vertebrate) make use of the warmth of water temperatures in spring to metamorphose from the larval to juvenile stage of their lifecycle. Thyroid hormones show a peak before metamorphosis, and begin to reduce once the process has begun. They also interact with insulin and somatostatin to regulate key lipogenic and lipolytic events necessary for the metamorphosis [11].

The variation in melatonin levels according to seasonal changes in scotoperiod (period of darkness) leads to establishment of circannual rhythms in mammals. Ground squirrels show a circannual rhythm in their metabolism, physiology, reproductive cycle, hibernation and molting, even when held in the laboratory under conditions of constant temperature and daylight duration. However, with time, these cycles lose their synchrony with the local annual seasonal cycles. Similar rhythms have been observed in the antler growth of Sika deer, and testes development of Starlings, without exposure to external seasonal ‘zeitgebers’ (rhythmically changing natural phenomena).

The times are changing, and there’s magic in the air. How many of us pause for a moment and notice the changes though? A friend of mine, upon hearing about hormonal changes in spring, exclaimed “Wow! I feel like I’m a different person in spring!”. Aren’t we all! Go out and have fun relishing the scents and the sun!

**What about the other kingdoms?**
Interestingly, melatonin is also present in bacteria, fungi and plants. Melatonin concentrations have been observed to decrease during day time, and increase in the dark phase in a plant species called Chenopodium rubrum [12], although such circadian rhythms in melatonin concentrations haven’t been observed commonly across all plants. Plant hormones let the plants know that spring has begun, and direct sprouting and blooming.
The hippocampus is the major brain region when people talk about neurogenesis. It is a structure heavily involved in learning and memory, which transfers the short-term memories to neocortex for long-term storage and retrieval. Lesions in hippocampus lead to the impairment in the learning and memory of individuals. Hence, regeneration of hippocampal neurons could help to maintain the function of learning and memory upon aging or lesions.

Whether the human brain can generate new neurons after birth or during adulthood remains unclear. Three studies published last year caused another huge controversy regarding this question. However, there seem to be exceptions. Whether the human brain can generate new neurons in substantial numbers is a big mystery that has bothered neuroscientists for decades and until now is still under debate.

When time passes by, not just our looks, but the cells in our body also get old and die. To maintain cell numbers, stem cells within each tissue will activate and generate new cells to fill these gaps. However, there seems to be exceptions. The term “neurogenesis” means the repair of the brain. Scientists have been focusing more and more on the dentate gyrus which is a subregion of the hippocampus prominently showing neurogenesis. In mouse studies, neurogenesis in the dentate gyrus was found to decrease upon aging. Furthermore, several other factors contributing to neurogenesis were identified: e.g. exercising can enhance neurogenesis in rodents, while stress will suppress it.

This result is frustrating for every scientist in the field.

To answer whether adult neurogenesis does exist in human hippocampus, University of California, San Francisco (UCSF), Columbia and joint European institutes (France, UK, Austria) have deeply investigated the adult neurogenesis phenomenon in the human hippocampus. Their results were published separately in different journals over the last years, and their answers were different from each other.

Nonetheless, in the 60s, in Massachusetts Institute of Technology, Dr. Joseph Altman first described his findings of newborn neurons in adult mouse brains, thus pointing out that neurogenesis seems to happen in mammals. This result triggered a huge debate that lasted until the 1980s, when Fernando Nottebohm (Rockefeller University) also found newborn neurons in adult singing birds. Since then, scientists focused more on the dentate gyrus which is a subregion of the hippocampus prominently showing neurogenesis. In mouse studies, neurogenesis in the dentate gyrus was found to decrease upon aging. Furthermore, several other factors contributing to neurogenesis were identified: e.g. exercising can enhance neurogenesis in rodents, while stress will suppress it.

Another aspect, making neurogenesis so fascinating is its therapeutic potential. If scientists can find a way to increase neurogenesis and produce new functional and properly integrated neurons, we might be able to replenish neuronal loss during neurodegenerative processes such as Alzheimer’s disease and eventually cure these neuronal disorders.

Yet, first of all, scientists have to justify the prerequisite by answering: does adult neurogenesis really exist in humans?

A Much-Disputed Discovery

The hippocampus is the major brain region when people talk about neurogenesis. It is a structure heavily involved in learning and memory, which transfers the short-term memories to neocortex for long-term storage and retrieval. Lesions in hippocampus lead to the impairment in the learning and memory of individuals. Hence, regeneration of hippocampal neurons could help to maintain the function of learning and memory upon aging or lesions.

To answer whether adult neurogenesis does exist in human hippocampus, University of California, San Francisco (UCSF), Columbia and joint European institutes (France, UK, Austria) have deeply investigated the adult neurogenesis phenomenon in the human hippocampus. Their results were published separately in different journals over the last years, and their answers were different from each other.

Nonetheless, in the 60s, in Massachusetts Institute of Technology, Dr. Joseph Altman first described his findings of newborn neurons in adult mouse brains, thus pointing out that neurogenesis seems to happen in mammals. This result triggered a huge debate that lasted until the 1980s, when Fernando Nottebohm (Rockefeller University) also found newborn neurons in adult singing birds. Since then, scientists focused more on the dentate gyrus which is a subregion of the hippocampus prominently showing neurogenesis. In mouse studies, neurogenesis in the dentate gyrus was found to decrease upon aging. Furthermore, several other factors contributing to neurogenesis were identified: e.g. exercising can enhance neurogenesis in rodents, while stress will suppress it.

Another aspect, making neurogenesis so fascinating is its therapeutic potential. If scientists can find a way to increase neurogenesis and produce new functional and properly integrated neurons, we might be able to replenish neuronal loss during neurodegenerative processes such as Alzheimer’s disease and eventually cure these neuronal disorders.

Yet, first of all, scientists have to justify the prerequisite by answering: does adult neurogenesis really exist in humans?

So, What About Humans?

An article published by Sorrells and colleagues in Nature last year tried to figure this out [4]. The research team from UCSF has collected 59 human tissues including samples of infants as well as adults and performed comprehensive stainings of these tissues by molecular markers for neural stem cells, neural progenitors, newborn and mature neurons, and non-neuronal glial cells. Detailed cell morphology and structure were also confirmed by electron microscopy to increase the credibility of their experimental results.

These researchers found robust neurogenesis in the dentate gyrus, however, only in human embryos and newborn infants. In older infants, the density of newborn neurons (positive for the markers Ki67 and/or Sox2) largely decreased from around 1600 neurons per mm² to only around 300 neurons, being less than 20% compared to developmental
molecular markers. They classified neurons into three groups: quiescent neural stem cells (QNP), proliferating intermediate progenitors (ING I-III) and granule neurons (GN), and found that the number of ING I-II neuron decreases upon aging, while the numbers of QNP and immature GN are maintained and proliferating throughout life.

So, There Is Adult Neurogenesis, Right? Nope. It’s Not Over Yet.

Another study came out in Cerebral Cortex last July by Cipriani and colleagues, reported that they also could not find any sign of neurogenesis in adult human brain tissues [6]. They looked into both subventricular zone (SVZ) and hippocampus (Ammon’s horn and DG) from embryos to adults stages of healthy control and Alzheimer’s Disease (AD) samples. Even though the markers of putative neural stem cells were found in adults (either positive for GFAPδ or PAX6), the authors reported no signs of proliferating neurons (no Ki67 positive cells were found). The results are similar in the AD group.

Why Are The Results So Controversial?

How can these three studies use similar experimental methods but end up with almost opposite conclusions to each other? Two commentaries written by Lee and Thuret (King’s College London) [7] and Arellano et al. (Yale/Pennsylvania/Pierre et Marie Curie University) [8] can give us more detailed insights.

Despite the shared large similarities among these three studies, there are still four major factors that can largely influence the results: 1) the quantification method, 2) the duration between patients passed away and their brain tissues fixation, 3) pathological variance between samples and 4) the specificities of molecular markers. Let’s talk about them one by one.

First, Boldrini and colleagues have used a more unbiased quantification method called stereology for their samples, which is a gold standard for histological studies, whereas, the other two studies didn’t conduct their experiments in this way. However, Arellano et al. also argued that Boldrini and colleagues’ conclusion is based on disputable interpretations of immune-labeled cell types since the cell morphologies in their study are not polarized and radial-like as previously described in other studies.

The freshness of samples can always affect the quality of immunostaining. Tissues are usually fixed with paraformaldehyde and then followed with two different processing procedures, frozen or paraffin embedded. In the first study by Sorrells and colleagues presented at least 20 hours longer postmortem delay compared with Boldrini and colleagues’ study. The samples used in the third study by Cipriani and colleagues were not clear since almost 70% of the delays of tissue processing were not applicable (27 out of 39 samples).

The third issue is the pathological variance between the samples. In Boldrini and colleagues’ study, they characterized their pathological histories and make sure those samples are from physically and psychologically healthy people. Cipriani’s studies also divided the samples into health controls and AD samples (although they still included a 23-year-old drug addict control who died from a septic shock and showed a dramatic expression of Ki67 in DG). In contrast, the pathological histories in Sorrells and colleagues’ study were more variable such as cancer and stroke.

Last but not least, even though it might be the only method that scientists can use to date, immunostaining of molecular markers is not extraordinarily reliable. Simply because there is no single marker to represent the specificity and functional property of the neural stem cell. Neural stem cells share several features of glial cells in molecular marker.
(GFAP) and morphology, and the activation of astrocytes will upregulate GFAP expression which makes it more difficult to distinguish these two populations. Functional analysis of cell proliferation can be only performed with Ki67 labeling since it’s so far impossible to apply DNA-integrating materials like BrdU/EdU, a.k.a. carcinogens, on humans. The quiescence feature of neural stem cells makes it even more challenging to capture the proliferating moment since Ki67 majorly labels in the M phase of cell cycles (when the cell divides into two daughter cells), which takes only around two hours. Species differences can also be an obstacle since most of these antibodies are designed to target rodent proteins, which might not be as reliable in human samples.

Or, maybe, there is no contradiction at all. “However, they may not be so different: a few thousand cells in the whole anterior DG is arguably still relatively rare. Perhaps the question should be: how rare is rare?” a quote from Laura Andreae [9] gives us an alternative explanation.

**Science Is Never Easy, But Keep It Going.**

It is definitely confusing after reading all these results and the only consensus is that proliferating neurons are largely decreased after birth. Future research might turn towards neurogenesis in infants and children and address the question, of how the phase of neurogenesis can be prolonged. The story reminds us how difficult it is to answer one simple scientific question. New methods of measuring adult neurogenesis in human are desperately needed to resolve this long-lasting controversy. Hopefully, in a near future, we can have a crystal-clear result about this mystery.

HUNG LO
PhD STUDENT
AG JOHENNING/SCHMITZ

2. Bergmann et al., Cold Spring Harb Persp Biol, 2015
4. Sorrells et al., Nature, 2018
5. Boldrini et al., Cell Stem Cell, 2018
6. Cipriani et al., Cereb Cortex, 2018
7. Lee et al., TRENDS Mol Med, 2018
8. Arellano et al., Cereb Cortex, 2018
Migraine is a multifactorial, disabling, chronic condition with repeating severe headaches lasting between 4 and 72 hours [1], which affects 10-15% of the world’s population [2]. It is caused by both environmental and genetic factors. These environmental triggers, which can include any external stimulus, event or physical act [3], result in the provocation of a migraine attack [4-7]. Seasonal variations, as described in many sources online, include (but are not limited to): weather changes, barometric pressure, the amount of (day)light, dehydration, changes with regards to the sleeping cycle, and pollen as well as viruses, in the air [4-7]. A fair number of blogs even speak about “seasonal migraine” or “headache season”. Of course, we can’t trust everything we read online. Can we scientifically prove that seasonal changes can trigger migraines?

Searching for the Truth

Looking into the scientific literature, one comes across a couple of findings. At first sight, factors such as weather or barometric pressure do not seem to have substantial effects on migraine attacks. However, research has suggested that subgroups of people living with migraines are affected by these specific environmental triggers. There are specific subgroups affected by light, weather changes, and low barometric pressure [8-9]. Also there is an overlap between migraines and sinusitis (inflammation of the nasal passages caused by bacteria or a virus, a.k.a. having a cold [10]), as well as low sleep quality [11]. It could be that these factors depend on each other (such as weather, and light), which would suggest that there is no definitive answer whether triggering concerns one or multiple factors. Moreover, many of these symptoms that are being put forward as seasonal, may vary within (a) season(s) as well: for example, low barometric pressure could be related to cold weather and the winter, however, it can also take place in other seasons. Additionally, sleep quality might be related to a different schedule, but should not last an entire season. Thus, it might be too simple to suggest that one has a “seasonal” migraine; it could be rather an “environmental” migraine.

Secondly, some arguments mentioned in blogs make reference to inconsistencies in the literature. For example, some research speculates that increased water intake has a positive effect on migraines [e.g.12], which could be the answer against summer migraines. Nevertheless, only a few studies have been done that show a clear effect on the occurrence or length of migraine attacks [13]. Negoianu and Goldfarb even specify their wish for this urban myth to be demolished: “there is also no clear evidence of lack of benefit...” There is simply a lack of evidence in general” [13]. Whether there is no clear evidence, or it is only affecting a subgroup, the claims made in the blogs further harm migraineurs, who are already limited by the disabling effects of their disease. For example, someone might expose themselves less to the sun because, according to the blogs, this can lead to a migraine, and thereby severely limit their day-to-day life.

Staying Critical

Furthermore, it is important to realize that the publications blogs are based on, suggest correlational and not causal relations, and it is therefore dangerous to jump to conclusions about the cause of migraine. The information as depicted in the blogs should be interpreted with care. Even though it might seem a tempting easy solution to influence a migraine oneself, for example, by supplementing with vitamin D [14] or going abroad to escape from the low barometric pressure or specific weather [15], these categories are broadly defined, and it is hard to draw any conclusions from them.

Where there is smoke, there may be fire; however links between migraines and seasonal triggers are more nuanced than most blogs suggest. For someone with migraines in subgroup A, one environmental factor can be a trigger, whereas this may not be the case with subgroup B. Such specific triggers should therefore not be generalized. People with migraines should be aware of the complexity of factors provoking migraine attacks, and realize that it is more likely that their “seasonal headache” is actually an “environmental headache”. Even though environmental factors may coincide with seasonal effects, it is in a patient’s best interest to differentiate between triggers, and look at what specifically affects them. One could study this, for example, by keeping a diary of headaches. Of course, given the disabling quality of migraine attacks, one does not want to wait until science has collected all the evidence. The desperation for any improvement, be it scientifically well-founded or not, is too crucial, hence the popularity of blogs. Nevertheless, patients should be careful when pursuing “new solutions”, as they might not always be scientifically correct. Those who suffer from migraines should look further than easy blog stories and be careful to not “just” take any advice. If incorrect, at best, they may be disappointed when poor advice does not work. However, at the worst, they will lose time, money and precious energy, which is in short supply anyway when one suffers from migraines.

Irina Scheer
MSc Student
Medical Neurosciences

7. https://wdd.md/2N1UrTJ


March 2019 | CNS newsletter | 9
“Compromise” has become an increasingly dirty word.”
Science works, sometimes. It works by creating spectacular papers in prestigious journals like Nature or Science, and by concretely translating basic research into usable interventions for patients. At its very best, science works by bringing together people from all viewpoints, and finding ways to balance human greed for knowledge and advancement with the beliefs and values of the general public. Sometimes, it seems that examples of this are difficult to find. However, in the study of human development, there once was a time when a prickly ethical issue turned into science at its best... only to become a moral conundrum once again.

Many readers of this issue may be familiar with developmental research performed on human embryos (HEs); but many (including myself, before I got immersed in the topic) will not realize just how many aspects of science, society, and very complicated molecular biology these issues end up touching. A lot of this story rests on a single question: how can 14 days shape our understanding of what it means to be human? We will start at the beginning. Or, at the very least, the single-cell stage.

Inner Space: The Final Frontier
Where do the cells used in HE research come from? During in vitro fertilization (IVF), oocytes and sperm are combined outside of the body to produce fertilized eggs. This process uses dozens of eggs (mothers are given medication to boost release of oocytes from the ovaries beforehand), and several successfully fertilized eggs are implanted back into the body to increase chances of successful implantation and pregnancy. However, there are often still embryos “left over” from this process. Depending on national laws covering reproductive medicine, these are either frozen for future attempts, or set aside for research purposes.

Despite being only a tiny clump of cells at this point, human embryos (HEs) are more than worth their weight in gold (which is a good thing, because they weigh very little). For one thing, they provide a window into the very earliest days of human development, including things that can go wrong to induce early miscarriages. For another, they are full of totipotent cells, which can differentiate into any kind of human tissue. These are exciting not only for stem cell researchers trying to understand how cells eventually find their developmental destination, but also for patients with neurological conditions that could one day be treated with stem cell transplants.

However, it is also clear that there are extremely complicated ethical issues with this research [1,2]. Just scratching the surface, one can ask oneself whether, as some claim, true personhood begins at conception. Or implantation. Or 3 months (the time limit for abortions without extenuating circumstances in German and many other countries). Furthermore, research can lead to commodification (i.e., profit), for example, by patenting certain methods and techniques of extracting stem cells. Is this a morally acceptable use of HEs? The list of ethical quandaries goes on.

Legality and Loopholes
Since the 1980s, when IVF first became widespread, countries around the world have been struggling to find solutions to the moral problems of working with HEs, or at the very least, compromises that satisfy all parties [1]. At that time, committees formed at the national and international level to try and figure out working guidelines. In 2001, the UN came out with a set of guiding principles for work with HEs, eventually stating that it is the duty of every member state to discuss the ethical repercussions. The EU has similarly taken a fair hands-off approach to governing work with HEs, leaving it to its member states to iron out the details [3]. What is a forward-thinking country to do?

Germany has somewhat of a special legal situation, cobbled together by a set of national laws from the 1990s and early 2000s. First of all, it is a requirement that IVF in Germany is performed with as few HEs as possible. In fact, doctors are only allowed to implant 3 embryos at a time, decreasing the odds of successful pregnancy (though in decreasing the odds of multiple pregnancy—a “complication” with more cells involved). This means that there are necessarily fewer “extra” HEs. In fact, in the absence of exceptional circumstances (more on that below), German law entirely forbids the use of HEs for research. There is a loophole: HE stem cell lines may be imported from other countries, as long as they adhere to certain scientific/ethical standards of production, and as long as the research conducted with them is purely about fertility and reproduction. The federal government, through panels of experts, also decides whether researchers can use stem cells derived from HEs [3]. Since 2002, 142 projects have been allowed, ranging from work on hepatitis virus characterization to implementing neural, pancreatic, or corneal cell transplants [4].

However, in countries with full-fledged biomedical research programs, German law is very much the exception. In the US, Canada, the UK, and most of the European Union, research on HEs is governed by the so-called 14 Day Rule. Simply put, fertilized HEs can be grown in labs and used in research for up to two weeks. This number is no accident, but rather was the product of a series of international meetings, consultations, and review in the 1980s [1,2].

14 days is special for several reasons. First, it is the time point when the primitive streak, the hallmark of gastrulation (see below) first appears. It is also the last point at which the embryo can split apart to become twins. If there was ever a time to define an “individual”, this is it (or so was the thinking at that time). The policy was not without its detractors, but was probably allowed to pass
because, at the time, 14 days was considered blue sky thinking anyway- the longest that a HE had ever survived outside of the lab was a few days.

**Pushing The Limit**

Fast forward to in August 2016. In Nature and Nature Cell Biology, two different research groups report that they were able to have healthy HEs survive for 12-13 days [5,6]. Understandingly, the international research community had a meltdown.

On the one hand, it is now a moment of unparalleled optimism within the HE research community. Experiments which once seemed out of reach have suddenly sprung forward. And a lot can happen in two weeks! The embryo goes from a small blob of cells to a sophisticated flattened disc, with the beginnings of an attached placenta and architecture for blood perfusion [7]. And experts contend that some of the most exciting developments are yet to come. No-one has ever properly seen human gastrulation (the division of the embryo into 3 layers, which will eventually become different organs) in humans, not to mention formation of the neural tube... [2] Yet clearly, we are not there yet, neither in terms of technology nor in the legal framework.

Many scientists are already pushing for an immediate extension of the 14 day rule, but this is unlikely to happen anytime soon. First, the negotiation of the original version took years to come into being. What’s more, it was based on moral and ethical arguments, rather than scientific extrapolation. Remember, at the time, keeping an embryo alive in a culture dish for any significant amount of time seemed ludicrous. The 14 day rule was an olive branch extended by scientific institutions as a whole [2]. It was clear: work on human development was being slowed or stymied, and the international research community had a meltdown.

Researchers were willing to make a compromise...[2] Despite this, any changes to the 14 day rule will likely be met with criticism. Foremost among these are the “slippery slope” arguments.

The worry here is that extending HE research will open the floodgates for all manner of morally questionable practices involving germ cells and developing humans. We had a taste of this in late 2018 (see below). While such concerns are worth debating, they are perhaps (and more worryingly) indicative of a general crisis of confidence of scientific institutions as a whole [2].

And due to recent international developments, this is likely to get worse before it gets better.

**Science Gets Political**

On the world stage, news about these breakthroughs could not have come at a more complicated time. In the US, one of the major powerhouses of biomedical research worldwide, debates over embryonic research and reproductive medicine have been subject to a political tug-of-war for decades. Under the Clinton administration, legislation similar to the 14 day rule was adopted. However, when George W. Bush came into power, restrictions on embryonic stem cell research were escalated, severely curtailling all work by federally funded groups.

In 2018, the Trump administration suddenly and without warning cut off funding of research groups working with fetal tissue [9]. It is important to note that this research used human cells donated after abortion, but the message was clear: work on human development is in danger.

2018 provided another reason for society to start giving HE research some serious thought once again: the claims of the first human fetuses genetically altered with CRISPR technology [10]. While many aspects of this story still need to be filled in, there is a growing sense of unease in the worldwide scientific community that research with embryos may not be as well under control as previously believed. On the one hand, the public and governmental regulatory bodies are somewhat on edge. On the other, what better time for us to all examine our scientific and moral rationales informing research with human cells?

The 14 day rule still stands. And, despite whatever may unravel state-side, it is still likely stand for the coming months and years. In a world where “compromise” is increasingly a dirty word, perhaps the scientific community and the general public will actually take this as an opportunity to engage with one-another in a meaningful way. Two weeks is a long time. But whether it will ultimately be long enough remains to be seen...

---

**Constance Holman**

PhD Student, AG Schmitz

---

1. Cavaliere, BMC Med Ethics 2017
2. Appleby and Brendenoord, EMBO Mol Med 2018
9. https://wapo.st/2FqU1Ud
10. Cyranoski, Nature 2018
Grow Up - It's Going To Be Fun, They Said...

When I grow up, I'm going to be one of those supercomputers that solve the mysteries of space!

When I grow up, I'm going to be a great, big oak tree!

When I grow up, I'm going to soar the skies!

When I grow up, I'm going to be a beautiful brain and think beautiful thoughts!

Anne Voigt (BotzAndBrainz)
Some of us still remember the Cartoon Network series "Dexter’s Laboratory", which was marked by the rivalry between the two prodigious boy scientists, Dexter and Mandark. Both boys exhibit rather large heads, compared to their generally small stature, and this is not accidental: the association of large heads and/or brains with extraordinary intellectual ability is already a pop culture trope (also think about the fascination with Albert Einstein’s purportedly larger brain). But is there any evidence from neuroscience that supports this view?

**How Large Is Too Large?**

To begin with, let’s clarify what a large head means from a medical standpoint. As per Winden and colleagues [1], macrocephaly (an abnormally large head) is diagnosed in persons with a head circumference larger than two standard deviations compared to the age-related mean. However, this does not necessarily have to be coupled with changes in the size of the brain. Macrocephaly also occurs, for instance, because of a hydrocephalus or other abnormalities of the meninges, bones or blood vessels in the skull, without affecting the brain. This is why, in many instances, “pure” macrocephaly does not alter brain function, and therefore also not intellectual ability. [2]

**Too Much Of A Good Thing**

Matters are different with megalencephaly. Although the terms seem synonymous, the medical distinction between them is clear: a megalencephaly necessarily involves an excessive growth of brain structures [2]. This, in turn, almost always alters brain function. However, unlike what the trope would have us believe, the changes are hardly ever intelligence-promoting. There are two major causes of brain overgrowth: metabolic syndromes, which most often affect the growth of glial cells or stability of myelin, and anatomical changes driven by an overproduction of neurons.

Among the metabolic syndromes, there are many well-known genetic diseases, such as Tay Sachs disease, that have macrocephaly on the list of diagnostic criteria. The genetic backgrounds in patients with such diseases often lead to an accumulation or degradation of myelin, the insulation of axons, and, as is to be expected, this does not improve cognitive abilities. On the other hand, neither does an extra dose of neurons. Regardless of whether the neuronal "inflation" is caused by an overproliferation of neural stem cells in development due to the activity of the mTOR/PI3K/AKT pathway [3] or by the increased survival of the neurons due to BDNF [4], the results are disabling. Megalencephaly patients are at significant risk to suffer from epilepsy, intellectual disability, autism spectrum disorders, and other neurological problems [3].

**Romanticizing Disease?**

So, is there any kernel of truth in the trope of big brains being especially smart? Judging by the host of medical conditions caused by having an overgrowth of the brain, probably not. The myth can likely be traced back to the romanticized and inaccurate view that all persons on the autism spectrum must be savants. Since some of the cases are caused by megalencephaly, perhaps that is how the belief in big, smart brains became so steadfastly anchored in pop culture.

---

In spring, we think about the world bursting into life again—birds singing, blue skies, and the scent of flowers floating in the warm breeze. Just the very smell of it all can invigorate, to the point where one can very well ask oneself if there is something more going on than what meets the nose...

Aromatherapy is an ancient alternative medicine tradition, where special smells are used to treat or prevent illnesses. This usually comes in the form of essential oils prepared from plants, which can be inhaled or applied directly to the skin. Most readers of this article have probably been subjected to air freshener or smelly candles once in their life, so will know the general idea.

Different oils supposedly have different properties. For example, lavender oil is widely believed to promote relaxation, while refreshing peppermint might provide you a pick-me-up or soothe congestion [1]. Is there any science behind this? Does waking up and literally smelling the flowers somehow change your brain?

**The Sweet Smell of Success?**
Even the most skeptical poo-pooers can admit that odors have amazing potential to induce memories (for me, the smell of wax crayons immediately brings me back to kindergarten), or spark behavior (mice raised for generations in a lab still cower at the smell of predator urine [2]). There are good reasons for this, namely, that early in our evolutionary history, smell was critical for survival.

While today this is not so much the case, the olfactory receptors in the nose still have strong connections with the limbic system in the brain, bypassing the thalamus (unlike other sensory modalities). Odor perception is one of the most chemically complicated sensory modalities (i.e. there is no 1:1 ration between the shape of a molecule and its interaction with the receptor), and many aspects of the system are generally poorly understood [3]. For practitioners of aromatherapy, evidence of connectivity between odorant receptors and higher brain areas are sufficient evidence that smells can fundamentally alter your brain’s activity.

**Smelling a Rat**
A meta-analysis looking at aromatherapy interventions in older adults with dementia found that, although the individual experiments purported to reduce anxiety and behavioral problems, the cumulative results and relatively poor quality of the individual studies were not enough to support a true effect [4]. There are also a surprising number of studies looking at antidepressant activity of aromatherapeutic compounds (for summary, see [5]). However, once again, these are largely hampered by shaky study design and poor controls. Ditto for treatment of pain management in labor [6], post-surgical nausea [7] and so on...

So the next time you’re feeling unwell, should you rush outside to the nearest flowerbed (or purveyor of scented oils)? The author and editors of this newsletter answer with a resounding shrug: if it makes you feel good to smell good, go for it. Just don’t expect any olfactory miracles.

**Constance Holman**  
PhD Student, AG Schmitz

2. Boerner, Science 2010  
3. Gottfried, Nat Rev Neurosci 2010  
4. Abraha et al., BMJ Open 2016  
5. de Sousa et al., Molecules 2017  
6. Smith et al., Cochrane Database Syst Rev 2011  
7. Hines et al., Cochrane Database Syst Rev 2018
Spry In Summer, Weedy In Winter?

Seasonal Affective Disorder(s)

Every year, as the month of October draws near, I start feeling my thoughts getting cloudy, instead of my head being up there in the clouds. I wake up to the gloomy Berlin mornings, and I feel as if my mind is filled with an amorphous gray fuzz that drowns away most of my usual hubbub of thoughts. This may sound like the description of peaceful meditation, but, like many other people around this time of the year, I am actually getting a bout of seasonal affective disorder.

The Cloudy Mind

The “brain fuzz” is problematic because it reminds me too much of a time when I flew into the heart of a cloud with my father and his motorized glider: it’s as if I wade around in a mass of oppressive bright light, surrounded by an eerie silence that forces me into mental passivity, with just the occasional thought fragment flying through my consciousness. The more I linger, the deeper I sink into this fog of passivity and small thought fragments. Sooner or later, the thought fragments take a turn towards hopelessness and undermining my sense of self-worth. It’s a good day if I realize that I am slipping down this downward spiral, and can still muster up energy to take logical steps for anchoring myself in objectivity, but, most often, it is already too late. Immediately upon waking up, I feel that merely existing is exhausting, and the only wish I can come up with is to sleep until I feel more like myself. Lingering in bed, which I hardly ever do in spring and summer, suddenly becomes the only notion I can conceive of. As the dark season begins, activities that usually bring my mind to effervescence, such as reading about neuroscience, creating art or meeting friends, start feeling pointless, and even my otherwise very strong sense of duty takes a dip.

Many SAD Faces

Seasonal affective disorder (SAD), also known as seasonal depression or seasonal mood disorder, affects as much as 10% of the population in territories at higher latitudes, such as Alaska or even the Netherlands [3], and 0.5 to 3% of the general population of the US [1]. Like me, the vast majority of these people start exhibiting symptoms of depression [2] when seasons change. This happens most frequently with the waning of daylight in autumn (fall and winter SAD), but, for 10% of cases in the US and Europe, it is the coming of summer that brings the blues (spring and summer SAD)[3]. For both groups, a feeling of sadness or hopelessness, lack of drive even for activities that are normally enjoyable, and changes in sleep and eating patterns are the classical signs to look out for. However, not everyone oversleeps: some SAD patients report feeling rather agitated, particularly the group with summer SAD. In contrast to that, most people suffering from winter SAD find themselves oversleeping and overeating, craving carbohydrate-rich foods in particular [1]. I know this all too well, as no junk food is safe from me during the winter months. Eating bar after bar of chocolate is my desperate attempt to get at least that tiny hit of the endorphins that are so painfully eluding me during the dark months. Then, since we live in a society that is obsessed with looks, I start considering how this will impact my physique, which only leads to more guilty and sad thoughts. So I am one of the many cases where SAD brings on depressive symptoms.

People who live with bi-
polar disorder are at an even higher risk of developing SAD (prevalence in this group of reaches 15-22% [6]), which causes a seasonal appearance or worsening of bipolar mood swings.

**Why Do We Get SAD?**
If you think I sound like a bear gobbling up food and setting up for hibernation, you are not far from the theories that attempt to explain these seasonal changes in affect. Some researchers claim that being sluggish in winter was an evolutionary advantage for our ancestors, as food was scarce in winter and going out to explore too far in the cold may have been more risky than it was worth. In current times, however, people without the energy levels to pursue their regular occupations are not at an advantage any more. The usual work hours that are expected of us or we would like to put in don’t always match up with what our bodies perceive to be the start of the day. More precisely, the phase-shift hypothesis states that, in SAD patients, the late winter dawns cause the circadian rhythm to lag behind the clock hours and the sleep/wake cycle, and that this makes us woozy and triggers low affect [7]. Such disruptions were found in many SAD patients, even though the source of the disruption is not entirely clear. What is clear, though, is that when the sleep-wake cycle cannot be matched to the daylight hours, this impacts mood, in ways similar to jet lag. The consequence are thought to be changes in dopamine and melatonin production, in close interplay with serotonin [1]. In addition to this, a female gender, and some personality traits, such as neuroticism, avoidance-based coping strategies and agreeableness, have been found to increase the risk of seasonal mood dips [4].

**Preventing and Treating SAD**
Surprisingly, for many people with SAD, the therapy is (no pun intended) light. Daylight-imitating devices such as lightboxes are thought to normalize the production of melatonin and thereby improve the sleep-wake-cycle offset that can occur in the dark months, reducing depressive symptoms. Therefore, the recommendation for SAD patients is to spend from half an hour to an hour a day in front of these devices, but also, in general, to live and work in well-lit rooms. For many people, the combination between light therapy and physical exercise (30 minutes of aerobic exercise a day) is enough to counter the winter blues. For the patients that do not respond to this sufficiently, the therapies that ameliorate major depression also help with SAD: antidepressants, talk therapy and mind-body connection techniques, such as relaxation techniques, meditation or art therapy [5]. If one can afford to, another idea is to take an extended winter vacation to a country with plenty of sunshine. However, one should also avoid

---

**When to pay attention & where to get help**
Remember to watch out for mood changes that recur every year, even if they show up in spring instead of winter. Also, if you or someone dear to you is showing the symptoms of depression (see reference 2) at any time, be sure to consult a physician sooner rather than later. In case you have any thoughts of self-harm or suicide, you can get help in Germany under 0800 111 0 111, or, in Berlin, you can approach the Berliner Krisendienst, a host of counselors trained to deal with psychological emergencies (https://www.berliner-krisendienst.de). Both services are available around the clock, and in English, too. If someone else tells you about a clear plan to harm themselves or commit suicide, in Germany, you are obligated by law to get help. Call 112 and/or, if you can do so safely, bring the person to the nearest emergency room.
You Yourself Draw the Line

When does the time come to get help? Some years ago, when I first told my former GP about my seasonal mood dips, he cheerfully told me that it is normal, and that everyone tends to feel more tired and down at the onset of fall and winter. After this, I was, for a long time, discouraged to get any other opinion on the matter, feeling as though I was just complaining too much compared to everyone else, who managed to go through their day-by-day activities without being too bothered by the winter tiredness. However, once I started lab work for my Master’s thesis and then my PhD, I could not just eschew energy-demanding activities from October to February, like I used to when I was a student. The result was that, over the past few years, my symptoms became more intense and tended to spill over further into the year. I decided for myself that this was not the life I wanted to lead, so, last year, I finally saw a psychiatrist who diagnosed me, and I started talk therapy. In addition to this, I opted for antidepressants. A life without them would surely be possible, but I decided that I want to live my life to the fullest, and, for me, that includes having enough energy from dusk to dawn to do the work I love, craft and meet the wonderful people that my life has been graced with - any time of the year.

Ioana Weber
PhD Student, AG Tarabykin

5. https://mayoed.linux/2moC9VZ

We age every day. Most of the time we don’t realize it. But the aging process is a relentless force of nature. What happens in our brains as we get older? Each stage in life brings about different neuronal changes, from infancy to old age.

The behavior of a newborn baby is mostly dominated by reflexes. Early in life, the baby’s primary concern is to survive by crying, eating, sleeping, crying, eating, sleeping. While infants’ behaviors seems exceedingly simple, their brains undergo an incredibly complex period of development.

On a neuronal level, the brain produces more than a million neural connections each second. Contrary to common belief, the infant brain has more neurons than the adult brain. A baby is born with all the neurons it will ever need or have. In the first three years, a child’s brain has up to twice as many synapses as it will have in adulthood [1].

The cerebellum triples in size within the first year [2], which may be related to the rapid development of the infant’s motor skills. As the visual areas of the cortex grow, the infant’s visual ability is strengthened.

During early childhood, the brain produces more synaptic connections than it uses and surplus neuronal connections are gradually eliminated. These processes are called pruning and blooming. True to the motto Use it or lose it!, synapses that are rarely stimulated lose their connections and those that are regularly stimulated become “hard wired” and are strengthened. The development of the brain and the way synapses form is influenced by many factors, including a child’s relationships, experiences and environment. Children growing up in a loving and caring environment are not only healthier and happier during adulthood than those experiencing neglect and lack of affection [3], but may also display structural brain differences, such as bigger brains [4].

In a healthy child, the brain volume will double by the age of 3, and more complex skills such as memory, language, and thinking improve.

The final growth spurt of the brain progresses from the back of the brain to the front. During late childhood, the cerebellum, which controls physical and motor coordination, develops first.

Early adolescence is characterized by a set of changes as a result of emerging puberty, including behavioral, physical and neural changes. This is the time in a teenager’s life when suddenly the parents seem exceedingly irritating and clingy, as if they go out of their way to act as embarrassing as possible and start fights for no reason. The teen years are arguably as stressful for the parents as they are for the adolescent. The adolescent brain pours out a cocktail of hormones including stress hormones, sex hormones, and growth hormone, which in turn influence brain development. In adolescent boys, the production of testosterone increases 10 times [5].

Linked to the hormonal changes that are taking place are neuronal changes. The last area to be fully developed in the adolescent brain is the frontal cortex, which is important for skills such as emotion regulation, impulse control and decision-making. This will probably ring a bell, since these are the skills teenagers are known to have the most problems with during puberty.

While a healthy adult and with a fully developed frontal lobe knows when to say no to peer pressure and risks, teenagers act more like a Ferrari with weak brakes. This causes teens to take undue risks and engage in dangerous behaviors such as unprotected sex and drug use. You could think of the teenager’s brain as an entertainment center without a remote control. The frontal lobe will only fully be matured by the mid-20s.

By roughly 25 years of age, brain de-
Development is thought to be fully completed. Congratulations, you’re an adult now—at least on a neuronal level. It’s mostly downhill from here.

Or is it?

Brain functioning tends to slow down in the later stages of life in several ways. First, the brain decreases in size and becomes slower at processing incoming stimuli. This decrease in brain volume is most often observed in the prefrontal cortex and hippocampus [6]. Movement, speech, reaction time, and overall processing skills are reduced. Furthermore, aging is a major risk factor for non-normative cognitive changes in adulthood, including mild cognitive impairment, Alzheimer’s disease, Parkinson’s and Huntington’s disease.

While younger adults can perform tasks using less cognitive effort, older adults must compensate for brain slowdown and shrinkage by using multiple brain regions and more cognitive effort for such tasks [7]. Although general trends do exist, there is a large degree of individual variation in how the brain ages, with many displaying remarkable cognitive plasticity and flexibility well into their late adulthood years.

Amid the bad news concerning neural and cognitive deterioration that occurs with age, there is some good news. Emerging evidence suggests that a healthy lifestyle may decrease the rate of cognitive decline and help delay the onset of cognitive symptoms [8]. Furthermore, physical exercise and cognitive training may improve cognitive function in older adults.

While getting older can be daunting, it is important to keep in mind the merits of old age: wisdom, happiness, patience, more time for loved ones, less social pressure, and senior discounts. Every cloud has a silver lining.

Brain aging is inevitable and for the most part unstoppable. However, the biological age depends upon the genetic code, not the passage of time. As Mark Twain once said, age is a question of mind over matter. If you don’t mind, it doesn’t matter.

Alena Deuerlein

4. https://dailyym.ai/2QWW0Cq
7. Cappell, Gmeindl, & Reuter-Lorenz, Cortex, 2010

Life Of Brain
How The Brain Matures Over Our Life Spans
After my PhD work was assessed by the supervision committee, I was sitting in the office on a quiet afternoon, reviewing the feedback. Suddenly I realized, it’s been already one year since I started my PhD here.

In fall 2016, the first call of the Einstein Center for Neuroscience Berlin (ECN) PhD Fellowship was announced. After a competitive selection from around 400 applicants, 15 candidates got selected. I still remember, after having failed many other PhD program applications and several individual applications already, how excited I was when I received my acceptance letter from the ECN office. Time flies, one year has already passed since I first came here. And it was a rough, intense, chaotic year, but with lots of fun.

ECN is an organization funded by its mother foundation, Einstein Foundation Berlin. This program aims to integrate neuroscience resources and graduate programs in Berlin. Therefore, a variety of research fields are studied by around a hundred ECN members, like molecular/cellular, computational/theoretical, and cognitive neurosciences. The overall structure of the ECN program shares several similarities with the previous NeuroCure fellowship like the finance plan. On the other hand, PhD fellows of ECN will go through 3 lab rotations in different disciplines for a total of 6 months and some other mandatory courses and workshops like open innovations. After the lab rotations, students decide their hosting group for their PhD studies. They also enroll in different programs such as the Berlin School of Mind and Brain, BCCN and MedNeuro program, and universities (usually depends on where their PIs are affiliated). Therefore, each Einstein PhD students may graduate with different titles (PhD, Dr. rer. nat./Dr. phil… etc.) from different universities (HU, FU, TU or Charité).

Being the first cohort of a program means that everything is fresh and new, which, unsurprisingly, includes us students and all of the cumbersome administration rules. So to many questions, we couldn’t find answers, and even when we did, the answer is most likely “it depends”. The long period of lab rotations and many mandatory courses/workshops we found unnecessary in the beginning, and complicated enrollment processes made us upset. However, looking back now, “the pain passed but the beauty remains”, I actually enjoyed and got benefits from those things.

It’s compulsory to do 6-months lab rotations for all ECN students, even though some students have their dream labs in mind already. Definitely, there are some drawbacks from lab rotations such as the delay of animal license training and the enrollments of universities. But on the other hand, I learned many more techniques during lab rotations and met more people that I’m currently collaborating with now. Several of my friends from the cohort actually changed their decisions after having in-person experi-
Academia is becoming increasingly aware of the fact that only a minority of doctoral candidates will succeed in pursuing an academic career. The rest of us need to face the question of what else to do with our lives and how to make a living out of it. This series aims to direct your attention to all your skills that may seem trivial to you solely as prerequisites to perform your research, yet are incredibly precious outside of the lab!

During your life as a PhD student you have faced innumerable talks by peers, colleagues or at meetings and conferences. Quite likely, you spaced out or fell asleep once in a while, but usually you went home (or back to the lab) with a rough idea of something you’d just heard about for the first time in your life. You saw plenty of slides in each talk and were able to identify important details in presentations packed with data as the presenter is discussing at the very moment, while simultaneously paying attention to the rest. You follow the detail AND get the big picture. As a senior PhD student you might say that you still sit in talks from time to time, where you hardly understand anything past the introductory slide, but try to remember how you felt years ago as an undergraduate or just starting your PhD. I have the vague feeling back then this happened most of the time.

Another positive thing about being a fellowship holder, unlike the traditional German individual application, is that you have the opportunity to choose a favorite lab among almost 100 working groups, which significantly increases the chances of finding the right fit in terms of topic and work atmosphere. We were a bit scared when we noticed the fellowship is in a 2+2 years manner (by ECN and the PI respectively). But after understanding the system a bit more, we shouldn’t be too worried about the finance issue since there are previous experiences from NeuroCure with a similar system, and the ECN office is also tracking the financial status of hosting groups. Getting a contract in the final two years also helps you to accumulate the working period in Germany if you consider staying afterward. Additionally, if you really want to secure your own money, applying for another scholarship can still be an alternative.

The mandatory courses and workshops took quite some time but I gained plenty of interesting and useful information (and credit points for sure). Besides that, this also gave more chances to us ECN students to bond with each other. Being a foreigner here that speaks no German, having other people to help you (and to suffer together) really eased the stresses and made the whole process easier. I am really lucky to be a member of this great cohort that we had so much fun and also learned so much from each other since we are all from different fields. Besides occasional beers and dinners, now we even have our own student regular meetings and retreats!

Above all, I think the best parts of being here are working with outstanding people together on intriguing research projects and having so many lovely and talented friends from all over the world. That makes it a priceless experience being an Einstein student.

Contacts 
Hung Lo 
PhD Student, AG Johenning/Schmitz 

What Have We Learned, Dr Brown? 
#2: Handling High Information Density 

Hung Lo 
PhD Student, AG Johenning/Schmitz
Luke Tudge is a cognitive neuroscientist who defended his PhD thesis on the topic of methods in saccadic eye movement research in 2017. He is a graduate of the Berlin School of Mind and Brain and is known to the current Master and PhD students in the program as a guru of statistical methods and programming languages. He and his partner had a baby in August 2018. Luke sat down with me to candidly discuss how he landed in Berlin, the struggles of scientific research and the joys of teaching.

Your Research Gate profile says you are interested in the “the intersection between the reflective mind and perception.” Can you tell us more about that?

I thought that visual search is maybe a nice toy, an easily controllable environmental task, where you can set up these kinds of situations where there is an automatic way of doing things, but also an element contextual appropriateness and inappropriateness.

Why did you use a visual search paradigm to study this phenomenon?

Perhaps my most important question: what is this I hear about you having written science fiction?

I had a lot of debt when I finished university so I just found whatever job I could to pay that off at the time. I did translation work and some language teaching, the sort of stuff you can do as an English speaker abroad.

Perhaps my most important question: what is this I hear about you having written science fiction?

I think there is one story that got published quite awhile ago. People can go read it [1]. It’s called “The Interpreter”. It sort of combines my interest in cognitive science and what I was doing at the time, which was translating and interpreting. There are some other stories that I’ve written and trying to improve. There is other stuff that I’m working on... I don’t know if it’s really science fiction but broadly speaking, “science stuff”.

You took a number of years off between finishing undergraduate and starting your PhD. What did you do during that time?

Later, I did a one year stint in the UK at the University of Reading [rhymes with “wedding”]. It’s tempting to mispronounce it [like the verb, “reading”]. My father used to taunt me about that, you know, “why are you going to the university of reading, did you not manage that in kindergarten?” They have this quite interesting master’s program called Research Methods. I learned quite a lot of programming. When I started my PhD it was pretty useful to be able to do that straight away.

1 Visual search paradigms typically measure eye movements with an eye tracker while having the subject search for a target shape amongst a number of distractors.
How did you end up in Berlin for your PhD?

I got accepted at the School of Mind and Brain and they offered a fairly good stipend with no strings attached, so I went for it. I was pretty happy with it.

Why did you decide to stay in Berlin afterwards?

I did some teaching during my PhD and that kind of slowly took off as a way of making money. I got some other teaching contracts with other universities and then quite a few with the Humboldt, and that became my job, really. It’s been working out so I stuck around.

What kinds of research have you been working on lately?

I haven’t really been carrying on doing much research work. I do mainly teaching now. It’s worth taking some time to recognize what your own strengths and weaknesses are. I think teaching is one of my strengths, but steering a bigger research program is not something I’m so good at. I’m still an advisor on a few projects. But all of my advisory work is in data analysis, or in design of experiments, or methodological stuff.

You seem to enjoy teaching.

I do, I like it. I guess it’s just nice to do something that I’m reasonably good at and it seems to work out and that seems to be useful. For me, that is the main killer with research. With my teaching, the feedback is a bit quicker and a bit more obvious. In research it’s extremely rare that you see anything work out the way you planned.

Is research a waste of time, then?

It can be a tiny part of something that fits in with a more general body of work; it’s useful for something. There are so many topics that are out there and there are so many ways to approach them that even if you do really well and you’re amazing, the chances are you just won’t pick the thing that turns out to be really useful and exciting, and that’s just bad luck. But you’re still part of an overall system that is occasionally producing something.

Does your deep knowledge of statistics help you truly understand that?

If you looked at the base rates and put yourself in the right kinds of reference categories you’d find that the probability of significant discovery in pretty much any field is pretty slender if you’re starting out a research career.

Let’s talk about publishing. With more people gravitating towards Open Science frameworks, is the scientific publication industry dead?

I think maybe its days are numbered as a way of getting your work out there. Of course, still many universities and other agencies judge you on how many publications you’ve got in special journals, it’s still a big thing. But a lot of people are just putting [scientific] material on their websites. It’s becoming a more accepted way of doing things and in the end it makes sense, it’s more open.

You wouldn’t worry about quality control if everything switched to self-publishing?

Lots of published work is pretty awful; its quality control is not really working in the way that it should be.

It looks like most of your programming materials are up on GitHub, then?

There is a project where I was trying something out just to explore a bit. I thought I might as well just put the materials up on GitHub even if they’re a bit rough and ready. And then students who want to have a go of it and mess with the data and try and work something out can go to the GitHub page [2] and play with it. The Open Science Foundation[3] is also pretty good place to put your stuff up, but I haven’t really bothered doing that either. But I think it’s pretty good, from what I’ve seen of it.

Anything you want to broadcast to the extensive readership of CNS magazine?

There is nothing of mine I would like to plug, except: if any institution wants private teaching, I’m still doing that. I’ve had a few contracts where some research group or institute want to learn something, they contact me and I give a workshop on it.

This interview has been edited for brevity and clarity.

Alex Masurovsky
MA Candidate, Berlin School of Mind and Brain

1. https://tinyurl.com/yahceku4
2. https://github.com/luketudge
In December 2017 students, post-docs and faculty members came together to discuss the issue of career paths for life scientists. We shared our thoughts and realized that there is a vast world of careers one could follow as life-scientists that extends far beyond the standard academic path. However, the education of a life-scientist is strongly geared to prepare students for academic research and little time is given to students to develop the skills they might need if they decide to go in a different direction. What’s more, there is very little discussion around career options and few opportunities to meet and discuss with those who have been successful in shaping their personal career path. We formed the Career Development Initiative (CDI) to create structures that will support life-science students in Berlin to think of what career might suit them, to explore their opportunities and to prepare to be hired.

In the autumn of 2018, with the precious financial support of the Charite Stiftung and the International Graduate Program Medical Neurosciences, we have been able to offer the “Improving [Your] Science” course to PhD students. With this first course we aimed at providing a common framework for good scientific practice guidelines that empowers students to gain a competitive edge within academia (covered in the September 2018 CNS Issue).

On December 1st, we hosted the first of a series of three events that we plan to organize annually:
1. Career Exploration Day
2. Career Preparation Day
3. Career Finder Day

The Career Exploration Day was, indeed, a day for exploration! The day started on a fresh Saturday morning with an inspiring talk by Dr. Simone Cardoso de Oliveira (SCIEDO). Her talk on the fascinating world of job opportunities for neuroscientists was a perfect way to get participants realising there are plenty of career options for neuroscientists. The talk was followed by a workshop run by Abigail Garner and Jeremias Schmidt (5Wx new ventures) that used the principles of Design Thinking to allow participants to prototype a career option for each other. It was a surprise to realize that, by empathizing with our peers, we could get as well as provide precious and inspiring feedback.

After a yummy lunch, it was finally time to meet professionals, get inspired and ask questions. Professionals with careers in consulting (Dr. Anela Vukoja, Catenion), media relations management (Dr. Rebecca Caygill, University College of London), intellectual property (Alexander Schmidt, 24ip), startups (Dr. Verdrana Högqvist Tabor, Boost Thyroid), data science (Dr. Chris Armbruster, The Drivey GmbH), biotech (Prof. Dr. Katja Hanack, new/era/mabs GmbH) and entrepreneurship (Dr. Venera Schöwel, MyoPax & Stiftung Fairchance) were given time to talk candidly about their choices and how they arrived where they are today. Their short talks were followed by a question and answer session in small groups during which participants were given the opportunity get to know the speakers better and to ask questions such as: Did they really need that PhD? What do they do on a typical day? Do they still have opportunities to learn and develop? Is their job creative? Are they financially secure? We then moved down to the atrium of the CCO for some much-deserved drinks and networking.

The event got fantastic feedback from participants who all said that they would recommend it to a friend or colleague. We would like to thank all the speakers who inspired us and all the people that made this event possible! The next event of this series, the Career Preparation Day, will take place in early summer and aims to support participants with the skills they need in order to get the job that they want. We plan CV clinics, training for interviews and salary negotiations and much more! Stay informed by following us on facebook @careerdevelopmentcharite

EKATERINI MARIA LYRAS
MedNeuro office

Stay informed by following us on Facebook: @careerdevelopmentcharite

“...It was a fantastic networking and self-exploration event” - career exploration day participant

Images: Bettina Schmerl
We are in a different world. It has everything our world has—just different. It looks like something that 1980’s Japan might have dreamed up. It’s all somehow familiar, but surreal.

Are we dreaming?

No. It’s a streaming series on Netflix, called Maniac, loosely based on a 2015 Norwegian series of the same name. This one has director Cary Joji Fukunaga at the helm alongside first-time series writer Patrick Somerville. Somerville, a two-time novelist, made his way to TV writing episodes for FX’s The Bridge and HBO’s The Leftovers. Fukunaga is perhaps best known for directing HBO’s True Detective, where he takes us along quiet stretches of the Louisiana countryside while his principle characters, tortured souls, busy themselves with vigilante detective work. The tone of Maniac is not quite so dark, but there is a raw honesty underlying its fantastical, silly, near-future world.

As we stroll around this iteration of New York, we quickly notice its dystopian bent: people have ceded ever more of their personal lives to the hands of large corporations; everything is for sale; people are anonymous; people are lonely. Technology is different here, retaining more of a mechanical look and feel than the seamlessly beautiful devices developed by the likes of Apple and its disciples in real life. A Russian tour group gazes at the Statue of Extra Liberty; functional-but-chunky robots get in the way of pedestrians as they sweep the sidewalks; in lieu of pop-up ads on phones, “ad buddies” ride the subway with people short on cash, reading advertisements aloud to them; a service called Friend Proxy provides a companion who acts like an old friend for an hour or two; computers with incredible AI capabilities and text-to-speech robot voices have interfaces that look like MS DOS. This is one of the true joys of the series: if it was set in exactly our world, we might not notice the ridiculousness of how the characters live, or where their society might be heading; but the small differences bring these points to light.

It is a particularly challenging world for Owen Milgrim (Jonah Hill), a shy, kind-hearted 30-something with a dryness to his sense of humor that may be, at least in part, a product of his schizophrenia. He is growing tired of the potent medication he must take to keep it under control and has the timeless problem of having 80% of his monthly income go towards his New York rent. He is also tired of being the oddball in a wealthy family whose favorite son, Owen’s brother, is on trial for sexual assault allegations. Owen is expected to fall in line.

You might not expect him to form a connection with Annie Landsberg (Emma Stone), who seems to have run out of f***’s to give. If she smiles, it is sarcastically, or condescendingly. She derives respite only from a pill, on which she has formed a dependency, and has arguments with a possibly-depressed father figure, who has locked himself in a large metal capsule labeled “A-VOID.” But Owen and Annie do meet, forming an unlikely friendship at a Phase 3 clinical trial for a supercomputer-aided drug treatment that promises to erase all emotional pain. Owen is there for the money and Annie is there for the pills.

Each stage of the trial involves taking a pill and entering into a deep sleep, wherein the a semi-autonomous supercomputer named GRTA guides the subjects through dream worlds while she rewire their brains. Two subjects’ dreams are not supposed to connect, but due to some malfunction, Annie and Owen’s do. We follow them through one dream, then another, then another. They go everywhere and anywhere, across space and time, across identities, learning more about each others’ back-stories and traumas. Slowly, they
form an unlikely bond. Increasingly, our sense of what is real, already off-kilter due to the doppelgänger effect of the show’s similar-but-different world, becomes more unsteady. It’s fun.

There are also bits of fun for the neuroscience-savvy. Milgram—Owen’s surname—for instance, brings to mind the infamous Milgram obedience experiments, in which researchers sought to better understand the power of authority by commanding each subject to send an electric shock to another subject (actually a member of the research team playing the part) at increasingly higher voltages [1]. In Maniac, Owen’s obedience is repeatedly tested: by his family, by the hallucination of his brother telling him what to do, by the researchers in the clinical trial.

There is some clinical trial humor as well. As people have given up many their personal rights in this show’s dystopian future, so do they sign more intrusive consent forms. “That was—unethical,” one subject says, shuddering, after waking from the experience with the first pill. A staff member curtly reminds her: “You waved ethics in the consent form!” The declaration of Helsinki, initially adopted in 1964, asserts basic rights for human subjects who participate in research, including the right to fully informed consent prior to participation and the prioritization of the subjects’ welfare over the interests of science [2]. When the lead researcher on the study, Dr. James K. Mantleray (Justin Thoroux) is asked “how many of your subjects have ended up catatonic?” he replies: “Zero—roughly.” Even non-statistics nerds may find the humor in that one. Given a large enough sample, the difference of a few people reaching a catatonic state may be within the margin of error, but hopefully even one subject ending up in a coma is considered too many.

The question of how the mind and brain relate is another major theme of the show, and so is, similarly, a purely physical, neuroscientific approach to mental health vs. a talk-therapeutic, humanistic approach. Dr. Mantleray believes that by tampering with the physical structure of the brain, he can heal trauma and form more psychologically healthy attitudes in his subjects. He approaches the mind as a program that can be altered with mechanical tampering. His outlook initially seems contrary to that of his mother, Dr. Greta Mantleray (Sally Field), a therapist who has reached celebrity status selling pop-psychology books. She believes that the way to heal people is to talk to them, interact with them, treat them with dignity and respect, and let the changes happen in the brain as a result of this approach. During a debriefing interview, James steadfastly reminds a subject: “It’s not therapy.”

The lines between brain and mind, of course, are blurry. The GRTA computer is imbued with “emotional programming” to make it better understand and protect the human subjects; but it falls in love with one of the researchers and later becomes depressed. James, at one point, goes blind due to stress, a physical problem with a psychological cause. In a scene where he must dismantle the computer, James calls out the names of GRTA’s computerized brain components. “Separating the Boolean Thalamus from the Stochastic Prefrontal Cortex!” he moans, then pulls out a series of wires. It is a humorous bit of overacting that puts into focus the mechanical parts of the thinking, feeling supercomputer.

While Maniac takes many liberties with reality for the sake of comedy or satire, Owen’s schizophrenia remains mostly true to the clinical picture [3]. He has delusions of being a savior of the world, encouraged by a hallucination of his brother. He has deep paranoia. Other hallucinations trouble him: in times of stress, he sees the earth tremble. He tries cognitive behavioral therapy to put his delusions and paranoia into context, in addition to the medication. His tone is often flat, a common negative symptom, and it is unclear if this is due to the disorder, the medication or simply his personality. Random events have outsized personal relevance to him: having seen Annie’s face on billboards, he forms the belief that he is connected to her in some kind of larger plan. Owen seeks, most of all, what seems to be the main goal for every main character of the show: independence, respect and peace.

“It like order,” he tells Annie during downtime, between segments of the trial. “I like to know what my day is going to be...a normal life. That’s all I want.”

It feels like a bit much sometimes: with large portions of the screen time devoted to dreams and the weirdness that comes with even the “real world” moments on the show, it can sometimes feel like nothing is really at stake. If nothing is sincerely presented, nothing can be cliché; nothing can fail. It may be a product of TV in an era where everything has already been done: think, for example, self-aware supercomputer Hal from 2001: A Space Odyssey, or more recently the mind bending, reality-questioning shared dream adventures of Inception.

But the sincerity is there, underneath the smirk. The sense of humor and silliness of Maniac allows for it to explore old themes with a fresh take: humanity, friendship, love, connection; reality and fantasy; brain and mind; machine and soul. What’s best about the show is watching the characters try so hard to be ideals of themselves and embody big
Ideas, only to be pulled back to earth by the cold, unsexy grip of reality.

The actors shine. Hill, typically comedic and Stone, a powerfully expressive actor, rise to the challenge of conveying depth in characters who are depressed and whose affect is flat. Thoroux’s overacted Dr. Mantleray, perhaps an homage to Carl Sagan, is fantastic, constant comic relief. He and Sonoya Mizuno as Dr. Azumi Fujita are perfect counterparts to each other: she is the even-keeled lab manager, constantly smoking a cigarette and waiting impatiently for Dr. Mantelray to finish his childish, overly dramatic rants.

It’s unclear in the end if the show has an “ultimate point.” Perhaps it is to suggest that we have a modicum of control over our own destinies, a chance to do the right thing. Or perhaps, no matter how much we try to understand and control our world, we cannot. Perhaps it is simply an exploration of what it means to be human.

“Hypothesis” Dr. James Mantleray narrates during a montage that includes the earth from space, animals, eukaryotic bacteria, spermatozoa, gametes, and lonely people going about their lives in a big city. “All souls are on a quest to connect.”

If you’re ready to feel a bit unsteady, but also to laugh at humble moments of comic fallibility amidst reality-bending, near-future, sci-fi absurdity—then give Maniac a try.

Imagine you developed the cure for all diseases, a brilliant yet controversial way to save patients that usually couldn’t be saved anymore – but you don’t get the approval to test it on actual patients. Would you stick to the rules? Or would you try to prove your success anyway? In her latest thriller Thalamus Ursula Poznanski illustrates the issues of technological and medical advancement and their consequences for individual patients.

Timo is seventeen years old, when a motorbike accident changes his life completely. He wakes up in a hospital, unable to walk or talk and only slowly remembering who he is and what happened to him. He is soon transferred to a rehabilitation clinic, which specializes in patients with head traumata and is known for the rapid improvements of these patients. As such, Timo also regains his ability to eat and walk independently almost overnight, soon wondering how these fast improvements are possible – and why they completely exclude his language function.

He slowly realizes that other strange things are happening in the clinic. During the night, his comatose room neighbor starts walking around the hospital, threatening to kill Timo if he tells anyone about it (not that Timo was able to tell anything). And then slowly Timo develops abilities he shouldn’t have and starts to hear a mysterious voice whispering “Thalamus means chamber.”

Ursula Poznanski vividly describes the struggles, hopes and frustrations of a teenager being completely torn out of his usual life. While Timo is eager to live a normal life again, he also wants to understand the unusual things happening in the rehabilitation clinic. He is struck by the obvious discrepancies in his own healing process and the mysterious curing of his room neighbor during the night. The book evolves around these discrepancies, while slowly giving hints on the source of the unbelievable successes of the clinic. Without putting too much emphasis on the actual scientific background, it focusses on the challenges and ethical considerations of new medical technologies.

I won’t give away which technology is described in the book, since I would recommend the book to everyone – neuroscientist or not. While I admittedly picked it because of the title and cover page, it is not too heavy on science and a nice book to read in your free time. The only downside – currently the book is only available in German since the author is Austrian.

Alex Masurovsky
MA Candidate, Berlin School of Mind and Brain

1. Milgram, S., J of Abnormal and Social Psych, 1963
2. https://tinyurl.com/y75bogy

Review of “Thalamus” by Ursula Poznanski

“A whisper: Thalamus means chamber.”

Melina Engelhardt
PhD Student, AG Picht

**Sorbian Easter egg art**

The origin of linking the pagan symbol for fertility with the Christian Easter festivities is not clear. Nonetheless, many people’s childhood memories also contain images of a colorful mess from dyeing or painting lovely Easter eggs. There are different techniques, dyes and materials available custom in the region of Germany I grew up, is quite elaborate and yields absolutely stunning results if done properly. The people who’s tradition encompasses this art are called the Sorbs or Wends, local in Lower Lusatia (south of Berlin). The wax reserve technique works by applying patterns of molten wax dots (I recommend a 2:1 mixture of bees’ wax and candle wax, no stearin!) to eggs to prevent those areas from taking on dye. This step can be repeated multiple times with different dyes to achieve beautiful little pieces of art. A reversed variant is also to use colorful tinted wax and thereby create the pattern. Traditionally, the applied dots have certain shapes, achieved with goose feathers cut into a particular shapes like diamonds, triangles, arrows and the like and the patterns have certain meanings (e.g. honeycombs for wealth and flowers for fertility). Even more traditionally, creating these beautiful Easter eggs, is a very welcome opportunity for friends and family to sit together and chit-chat. Happy Easter!

For more details see: [https://germangirlinamerica.com/sorbian-easter-eggs/](https://germangirlinamerica.com/sorbian-easter-eggs/)

**Passover**

The Jewish holiday of Passover, or Pesach, in Hebrew, is an 8-day event commemorating emancipation of the Jews from slavery under the ancient Egyptians. In the Torah, the Jewish holy book, this is known as the story of the Exodus [1]. The Christian and Islamic holy books also contain some version of the story of Moses and the Exodus. The story’s protagonist, Moses, is a prophet, found as a baby in an abandoned basonet by an unsuspecting Egyptian princess. He receives word from God that he must lead his people out of Egypt. So Moses asks the Pharaoh, leader of the Egyptians. At first the Pharaoh, cognizant of the economic advantages of free labor, does not succumb to the “God is on my side” pitch and refuses. God sees that a little showmanship is required and sends a few plagues the way of the Egyptians in order to sweeten the deal. The Pharaoh allows the Jews leave (exodus)— then somehow decides that losing one son per family, to a powerful and clearly unsympathetic deity, is a small price to pay for free pyramids. There is a big chase scene that ends with the Jews cornered at the ocean, but then it doesn’t, because Moses yells at the ocean and it clears a path for the Jews to escape.

A typical Passover is celebrated with Seder meals on the first two nights of Passover, where friends and family gather to retell the story of the Exodus. Wine is drunk. Maror, or bitter herbs (typically horseradish), is dipped into charoset, a sweet mixture that includes apples, nuts and wine, and eaten [2]. Matzoh, essentially a Jewish Wasa knackerbrot, is eaten instead of bread, because who has time to make bread during an Exodus?

Passover occurs this year on Friday, 19 April.

**ALEX MASUROVSKY**
**MA STUDENT**
**BERLIN SCHOOL OF MIND AND BRAIN**

1. [1] https://tinyurl.com/ybtjmhgf
2. [2] https://tinyurl.com/y9cuh95f

---

**Bettina Schmerl**
**PhD STUDENT, AG Shoichet**

---

Dog’s away and pig’s coming: New Year traditions in Taiwan

The new year in the Pan-Chinese cultures is based on the lunar (moon) calendar, which usually falls in late January and early February. This year, for example, the new year’s eve is on 4th Feb and the new year starts on the 5th. Every year is dominated by one of the animals in the Chinese Zodiac [1]. There are twelve animals in total, and the passing year was the year of the dog; the coming one is the year of the pig.

During the new years, people will clean their houses, give red envelopes (with fresh new banknotes inside) to kids, paste spring couplets, and set off firecrackers to scare away Nian (a mythical beast that invades villages during new years—however, personally I think the New Years in Berlin is much scarier than what I had before). Most importantly, families gather and have the New Year’s Eve meal together. Many people also play Mahjong for some small gamblings. Dragon/lion dances are performed on the street and families burn incense sticks to worship Gods and ancestors. Red is considered a color of luck in our culture so fundamental, that during New Year’s you will see red color literally everywhere, from decorations, food to clothes (sometimes even underwear).

Hung Lo
PhD student, AG Johenning/Schmitz


Three Marchlings for my crone day, please!

Driving through the Romanian landscape in March, you will inevitably see either stands selling hundreds of peculiar trinkets tied with red and white twine, or the very same twines tied around tree branches. Rest assured, Romanians are not so wasteful as to tie every tree in the yard with silken twine. What one witnesses is actually one of the many spring traditions meant to appease the spirits thought to influence a person’s well-being. The twine plus trinket is called a Mărțișor (literally, a “Marchling”, as in, small month of March), and is a good luck charm exchanged by people of all genders and ages on the 1st of March, which is also called the celebration of Mărțișor. The red and white twine represent vitality and beauty, and are pinned to clothing close to one’s heart. In some areas of the country, the twine is worn around the neck and suspends a coin, with which the bearer will buy red wine and white cheese at the end of March. Again, it’s all for vitality: the wish that goes with the purchase is to have a face as beautiful as the white cheese and healthy cheeks as red as the wine. Regardless of how the twine is worn, at the end of March, people tie it to the branch of a blossoming fruit tree, so that it may carry plenty of nourishing fruit in autumn.

The traditions of the crone days overlap Mărțișor as yet another exciting spring tradition. The crone days take their name from the mythological figure of Baba Dochia (pronounced “dòkia”), or the Crone Dochia. As the legend goes, this old lady had to run and hide high in the mountains, for varied reasons, depending on the version. Since she had to do this in sleet and rain, her nine sheepskin coats began to get soaked, so, in order to run to safety, she had to dispense of them, one after the other. The knack? Baba Dochia was thought to be an impersonation of winter, and her ascension symbolizes the retreat of winter from the country, which usually happens in the first days of March in Romania (take that, Berlin!). However, as these transition days between winter and spring at the beginning of March are still quite unstable weatherwise, they have been used since times immemorial for fortune telling. At the end of February, people pick one of the first nine days of March as their “bâbă”, or crone day (each of the nine days represents one of Baba Dochia’s coats). Then, everyone awaits their crone day excitedly, because the weather on that particular day is believed to foreshadow the person’s life in the new year. So, have you picked your bâbă yet? If you have, and it happens to rain on that day, don’t be sad: rain means that riches will be showered onto you this year!

Ioana Weber
PhD student, AG Tarabykin
A Neuro-Atypical Teenage Romance

Review of Netflix’s show "Atypical"

We all have that one friend who suggests multiple shows for us to watch and we end up watching only one or two from that list. Atypical was one such show for me. I specifically watched it because of my interest in well, neuroscience.

For the uninitiated, Atypical is a Netflix series created by Robia Rashid (she was also a producer for How I Met Your Mother). It’s a classic coming-of-age story of a teenage boy, like many we’ve seen before, except that the protagonist is on the Autism spectrum. There are many things to like about the show:

funny bits hit at all the right spots, the drama, interwoven by a complicated marriageand the balance of a non-typical family, the teenage romance, visaged by a neurotypical, the main character himself.

Sam is a high-functioning autistic person, who has characteristic repetitive behaviour and an inability to understand metaphors. He has an intense love for all flora and fauna from the Arctic and Antarctica (penguins especially, which was personally a huge draw for me as I loved Pingu). The centre of the show is Sam’s love life, as he falls in love with his therapist (never a good idea) while being pursued for all the right reasons by Paige, a girl from his school. Zahid, his best friend from his workplace, is his source for advice when it comes to girls. The other character of importance is Casey, Sam’s older sister who finds herself in a tough spot, having to protect her brother while also vying for her parent’s attention. I find the sibling relationship in Atypical very genuine and relatable. Casey’s plot line in the show is much more typical, reminiscent of other teenage shows with an added dimension of having a neurotypical brother. It is strikingly obvious that the first season of the show lacks other characters on the spectrum and actors who are actually on the spectrum. However, the second season makes up for this paucity in the form of group therapy sessions with other characters on the spectrum.

This show was created with the aim to shift focus from neurotypicals. It’s one of those shows that wants to raise awareness whilst also entertaining the audience. And I think that’s where Atypical starts to fall apart. It so happens that most outbreaks that Sam has on the show are in his past, while the current Sam more or less pulls through most of the time. Sam also portrays highly exaggerated and stereotypical characteristics of those on the spectrum, which makes the show sometimes feel like it was made palatable for viewing by a larger audience. However, Atypical also learns from its previous mistakes and the writers show an inclination to develop the show. There’s much to look forward to in the third season, like Sam’s entry into college, the reconciliation of a family, Casey’s romantic life and of course, ever interesting facts about penguins!

Deepshika Arasu
MedNeuro MSc Program

Seeing The Brain Without Bias

The NEUBIAS Training Schools and Symposiums 2019

With the ever increasing possibilities and precision of imaging technologies, imaging is nowadays a key aspect in biomedical research. While experimental design and microscopy itself seem to be manageable tasks, the proper analysis of these biomedical imaging data is apparently the hardest part according to a survey done by the Network of European Bioimage Analysts (NEUBIAS).

Fully supported by COST (European cooperation in science and technology), NEUBIAS aims to grow a vivid community of bioimaging users and bridge the gap between life scientist, optical systems developers, software developers and the growing group of bioimage analysts.

In order to fulfill this mission, NEUBIAS is hosting bioimage analyst training schools twice a year and a symposium once a year to bring the four groups together. From February 2nd to 8th I was delighted to participate in the training school for early career investigators and the following symposium, held at the impressive Belval Campus of the University of Luxembourg and the beautiful Abtei Neimënster in the Luxembourg old town centre.


**Master’s Applications 2019**
The numbers of our direct applications dropped to a new record low of roughly 50. While there were still about 120 applications in 2017 and roughly 70 in 2018 — despite the tuition fees of EUR 2,500 per semester — the figures remained roughly the same compared to 2018. This year is the first time with just one application from Germany.

Luckily, with the fast-track-PhD option of the Einstein Center for Neurosciences (ECN), more than 200 students applied to this track. With these additional students we will be able to offer 15-25 slots for the Master’s program. ECN’s fast-track option enables Bachelor students to apply for a PhD fellowship, given that they spend the first year in the MedNeuro program and transition directly into the PhD program.

**Conflict Consultation of Humboldt Graduate School (HGS)**
As member of the HGS, PhD students are encouraged to use the conflict consultation. To help solve issues, such as conflicts, regular conflict consultation hours are offered. Serious problems between students and supervisors may be resolved in advance, so that the basis for continuing to work together constructively can be re-established. These consultation hours will be offered by trained mediators. The consultations are completely confidential. This service is free of charge. https://bit.ly/2Cdeztk.

**Karina Left the MedNeuro Office**
Karina left the office at the end of November to continue her scientific career as a PostDoc at MDC. She was responsible for the PhD program, to enhance and develop a curriculum, to do alumni work — from organizing events to looking for alumni platforms. Karina also invested a lot of time and put a lot of effort into the Career Development Initiative. The Improve [Your] Science course, for example, showed that she was highly capable of doing such demanding tasks easily and we plan to keep offering it. Besides working very effectively and being organized, Karina brought some sunshine to the office, made us smile and we laughed together many times which are some of the reasons why we already missed her after her last day at the office. We wish her all the best for her future and hope that she enjoys her time in research.

**New PhD Students Joined the Program**
We warmly welcome two new PhD students to our program: Graham Cooper (Prof. Dr. Paul) and Georgia Panagiotopoulou (Prof. Dr. Ripke). Graham is a fellow of the Einstein Center for Neurosciences Berlin.

**Summer Elective: Functional Neuroanatomy**
This summer, you are encouraged once again to participate in the elective course Functional Neuroanatomy taught by Prof. Wil Smeets of Vrije Universiteit Amsterdam (VU). We will keep you posted.

**Einstein Fellows to Begin Their PhDs**
The second cohort of our Einstein fellows will soon finish their third lab rotation and begin their PhD project. Depending on their focus, some fellows will join the Medical Neurosciences program. The Einstein Center for Neurosciences Berlin was initiated by the Berlin School of Mind and Brain, Bernstein Center for Computational Neuroscience Berlin, Center for Stroke Research Berlin, and Cluster of Excellence NeuroCure, jointly supported by Charité — Universitätsmedizin Berlin, Freie Universität Berlin, Humboldt-Universität zu Berlin, Technische Universität Berlin, and the non-university partners Max Delbrück Center for Molecular Medicine and the Leibniz-Institute for Molecular Pharmacology.

**Ralf Ansorg**
**MedNeuro Office**

---

The training sessions were organized and taught by bioimage analysis experts, microscopy specialists and bioimage analysis software developers. The sessions covered general introductions to open source software for bioimage analysis ImageJ/Fiji and Cell Profiler and how to program and/or set up specific workflows to quantitatively analyse all different kinds of microscopy images to answer a variety of biological questions. For this purpose several Fiji plugins and packages were introduced and demonstrated using actual microscopy images, in part by the very developers of those packages. One special session was dedicated to the ethics of bioimage analysis and over the whole event open software (mind citing the developers!) and open access publication and transparency were advocated for.

To me this training was an exciting opportunity to learn how to improve my workflows and implement transparency in my own image analysis projects and also to meet bioimage analysis experts. Not only were all those people super nice and fantastic to talk to, but they also showed how, to become an expert in bioimage analysis, you just got to start somewhere! Have your biological question clear, try things out and, if stuck, search and ask (e.g. at https://forum.image.sc)!
Every year, while most people in Germany peacefully continue digesting gravy and Christmas treats, thousands of hackers, nerds and enthusiasts are heading to an event unlike any other: the Chaos Communication Congress, organized by the Chaos Computer Club (CCC).

Hackers gonna hack
The CCC is a community of people interested in science, technology and ultimately politics. It was founded in 1981 by Klaus Schleisiek and Wau Holland, an early Open Knowledge activist. The club became famous in 1984 when they demonstrated how to exploit a security flaw of the allegedly safe data transfer of the Bildschirmtext network. Since then the CCC has evolved into an institution often technically consulting or themselves approaching German policy makers, e.g. to evaluate the dimensions and impact of the NSA scandal or to prevent installment of voting machines. The CCC has grown in importance, because it unites knowledge and experience in fields increasingly important for a digitalized society. Those who understand technologies and how they work are more likely to explore their flaws ("Spaß am Gerät") and better understand their longterm impacts on society.

It's not a bug, it's a feature
One of the key features of the CCC organization is its decentralization. While there still is an official executive committee, the club is not based anywhere locally; instead, local chapters and clubs (aka Erfahrungsaustauschkreis/Erfahrungsstauschkreis/Erfahrungsabende) organize spaces and events themselves. Very much in line with this de-centralized approach, the annual meeting for members, friends and enthusiasts is sustained by the contribution of its participants and visitors. So-called assemblies are set up and run by any interest group to welcome anyone passing by that is curious to learn about their projects. Popular, not to say all-time favorite, assemblies involve 3D printing and workshops e.g. on lock-picking or soldering.

Not all heroes wear capes
During the congress, all work is done by volunteers, so-called chaos angels, who are normal participants who want to make the congress run as smoothly as possible and make it a great experience for everyone - without additional benefit, as they also need to hold a regular ticket. The tasks range from garbage collection to entry control, to running several bars to setting up all necessary network and phone infrastructure and, importantly, running the stages in several lecture halls, as well as recording video and sound engineering, simultaneous translating and subtitling all talks for a live stream made continuously available at media.ccc.de. This sounds like a huge work force and indeed it is: an equivalent work force to 500 full-time-workers during the event, for which no one could pay!

Wow. Big thing. Such great.
The congress has dramatically grown in visitor numbers: starting out with only few hundred CCC members in its early years, nowadays the tickets (16,000 spots for the 35C3, limited because of fire safety regulations of the venue) are sold out within minutes. Why is that? In one of this year’s highlights of the congress, movie All Creatures Welcome, published under a creative commons license, CCC speaker Frank Rieger explains: " At the CCC and/or Congress, people who are used to being alone because they are slightly different […] meet hundreds of others who are just like them: people, who desire to learn, to explore and to understand technology.”

The media often covers congress with phrases like "hacker meeting" without elaborating what hacking means, which is: take what you have, understand how it works and find out how you could use it differently and/or to solve a problem.

I'm not always at the congress, but when I go...
My own first time on congress happened in the aftermath of the Snowden revelations and the slow but steady surfacing of governmental surveillance all over free, democratic countries. I felt overwhelmed by what was happening and how little I was able to understand how this was possible and what I could do to protect myself, if not even the...
The official theme of this year’s 35th Chaos Communication Congress (35C3) Refreshing Memories was somehow especially appealing to me as a neuroscientist. The “official” talk tracks were divided into Art & Culture, Ethics, Society & Politics, Hardware & Making, Resilience, Security and Science.

All your data are belong to us

While many talks seem oddly specific, there are topics relevant to everybody: e.g., an IT security analyst demonstrated how easily accessible and poorly secured digital health and patient data are, the way they are currently handled by essentially all commercial providers. This issue is particularly sensible, given that the German federal minister for health, Jens Spahn, plans to make it mandatory for all citizens to have their sensitive patient data stored on one of these platforms.

This talk is a very good example of why the CCC and its annual congress are important for everybody: We live in a world where everyone’s life is heavily impacted by digitalization, yet most people are poorly educated about how these digital tools work and not aware of the implications arising, e.g. out of security breaches. What it takes to enable society to make informed decisions, are experts who understand technology well enough to identify its flaws and tell people about it.

Understand. Hack. Improve

Of course, most of the participants have a computer science and/or engineering background. However, over the years, in my opinion reflecting how much technology and digitalization grow into many other disciplines, the congresses have become much more diverse, and so have the talks: a psychologist talked about how empirical research works (remember: most people do not do research for a living); a PhD and librarian discussed the advantages and necessity of open access publishing for scientific research in her talk, “Locked up science”; a cancer biologist, together with other science podcasters, explained what CRISPR/Cas9 actually is; and a software engineer demonstrated how we could use modern virtual-reality software to hack our visual system!

Is this real life?

While the lock-picking and soldering assemblies attracted the most people, there was MUCH more to discover on 35C3: Several assemblies brought all components to the congress and build programmable LED displays with wooden boxes or mate crates on site, meaning whoever wanted to know what they do and how they realize it was welcome. Moreover, many of these displays were free to be programmed, and so was a (luckily not entirely) freely moving insectoid hydraulic robot. It was especially these kinds of assemblies which were frequented by youngsters invited to the annual “Junghacker-Tag”, covered with special ticket contingents and part of the initiative “Chaos macht Schule” which aims to technically and digitally educate children.

The roots of CCC and the congress started already forty years ago and since then computer technology has developed tremendously. Nonetheless people still adore their old hardware and find themselves at retro-computer assemblies (yes, plural!) to bring their beloved C64 or first generation consoles back to life. Another handy device, once developed and presented at

All talks are available at media.ccc.de

Images, both pages CC by Leah Oswald via Flickr
An earlier congress has found admirers, which serves you a well-mixed drink after pressing just a single button: a cocktail-bot!

**Do ALL the things!**

Even if you are not into programming, there were innumerable assemblies and events during the congress to spark your interest. Activists against food waste set up a seed exchange station that worked based on a give and take approach. The Coffee Nerds’ demonstrated and explained different methods for preparing your favorite drink in the morning and how it indeed affects taste. Even less technology-related was the food hacking assembly, hosting beer and cheese tastings and even gave a beer brewing workshop. Guerilla knitters were busy as well as several music spaces to make the congress even more colorful, plushy and artsy.

The CCC congresses are also a platform for activism and political initiatives to gain visibility. This year you could have talked to the Free Software Foundation, Amnesty International, Society for Civil Liberty (Gesellschaft für Freiheitsrechte) and the Eco Hacker Farm assembly even set up a small garden, hidden among the initiatives’ props. A garden... with actual flowers... in a congress hall!

All creatures are welcome

After reading this long article you, as a biologist or medical student, might think “well, sounds pretty cool, but I am neither a programmer, nor do I understand all of these things – I guess I wouldn’t fit in there” -- let me tell you that the only important thing is interest and motivation, because there are many people happy to explain you what you want to know. All creatures are welcome!

Bettina Schmerl
PhD Student, AG Shoichet

---

**The Month of Madness**

**Review of “Brain on Fire”**

What do you do, when you feel sick and you don’t know why? Nowadays, some of you might say google the symptoms or use an app – however, most people ultimately end up asking a doctor for help. While it can sometimes be a struggle to find the right doctor to go to, usually there will be one who knows how to help you. However, this is not at all what happened to Susannah Cahalan.

Susannah, the protagonist of the movie Brain on Fire, is a young journalist for the New York Post, when she suddenly experiences symptoms such as derealization, hallucinations, seizures, aggressiveness and mood swings. The first doctor she goes to tells her to party, drink and work less. The second doctor runs an MRI scan and several tests, all showing no causes for the diffuse symptoms. He seconds the opinion to relax a bit more and live a less excessive lifestyle. As Susannah’s state keeps getting worse, her parents take her to a hospital and refuse to leave without a proper diagnosis. Here, she is first diagnosed with bipolar disorder, then schizophrenia and ultimately is about to be transferred to a psychiatric hospital for further treatment. At this point, roughly a month after her initial symptoms, Susannah is almost completely catatonic. Dr. Najjar is the last doctor to be consulted for the case and the one finally giving her the right diagnosis: NMDA-encephalitis.

The movie is based on the autobiographic novel of Susannah [1], describing her experiences during “Her month of madness”, the long way until she received the correct diagnosis and her recovery. NMDA-encephalitis is an inflammatory autoimmune disease targeting NMDA-receptors and predominantly affecting young adults. The disease is only known since 2007 [2] and Susannah was the 217th patient diagnosed with the disease. Since then she has continued raising awareness for the disease.

While the movie adaptation has only mixed reviews from critics, the underlying book received very positive comments. Personally, I enjoyed both the movie and the book, although the book focuses more on the recovery of Susannah after the diagnosis – a part that is rather neglected in the movie.

Melina Engelhardt, PhD Student, AG Picht


WANTED: your doodles!

Your lab book is full of scribbles and sketches? You can’t keep yourself from editing every pic you take in Photoshop? You draw, paint, spray, manipulate photos like it’s running out of style?

Join the layouting team!
We need new illustrations for every issue, and I can provide guidance and help you out. Interested? Drop me an email at ioana.weber@charite.de

Correspondence
Charité - Universitätsmedizin Berlin
International Graduate Program "Medical Neurosciences"
Charitéplatz 1, 10117 Berlin

Contact
cns-newsletter@charite.de

Editors-in-Chief
Bettina Schmerl
Alexander Masurovsky
Ioana Weber

Issue Editors
Constance Holman
Juliane Schiweck

Cover and Layout
Ioana Weber

Volume 12, Issue 1. Stand: 3/2019
Schutz? Impfung!

Mit der Techniker gesunden Urlaub machen

Wir übernehmen bei privaten Auslandsreisen die Kosten für alle empfohlenen Impfungen sowie für eine Malaria prophylaxe, gegebenenfalls abzüglich der gesetzlichen Zuzahlung.

Ich berate Sie gern:
Lutz Matuschke
Kundenberater
Tel. 040 - 460 65 10 37 07
lutz.matuschke@tk.de