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Smartphones and tablets – the sequel

Peter A. Rinck



A couple of weeks ago I wrote a column about LBMs (little black machines) [1]. The article had so many clicks that I wondered what attracted such a wide audience to read it. There was no outcry; people seem to know and accept that the ever sprawling use of mobile phones in front of others can be ill-mannered and antisocial. The comments I received were rather favorable, interspersed with some remarks that certain uses of tablet computers and smartphones in hospital and private practice can be helpful and make life easier for both patients and doctors. I agree.

In the column, I cited an article from the International Herald Tribune: "Matt Rogers ... led a team of engineers at Apple that wrote software for iPods. He loved his job and working for Apple, he said. But he added: 'In essence, we were building toys. I wanted to build a product that could really make a huge impact on a big problem.'" [2]

If there is no fitting problem, somebody will create it.

■ This leads us to the topic of this column: applications of tablets and smartphones in radiology. One of the problems seems to be image-reading outside the department of radiology. To serve as pretext and to give it the right feeling, people call it "emergency reading." I wonder how much emergency reading there is – and where the people want to read.

Tablets and smartphones are beautiful image viewers for certain occasions, but they are amateur tools and don't and won't fulfill minimum standards for workstations used for clinical image interpretation.

For me, an emergency is a situation when you have no other choice other than using your private pick-up as an ambulance or making a tracheotomy with your pocket knife. Reading images of an MR angiography in front of a cozy fire in your fireplace at home is not an emergency.

■ There are clear rules and regulations for image display devices to optimize clinical safety and workflow, national ones such as the German DIN, and RCR and IPEM in the U.K.; and international ones such as DICOM and ISO. Smartphones and tablets do not even fulfill the minimum standards. Their use for primary diagnosis, clinical image interpretation, is forbidden – correctly so.

Primary display systems are employed for the interpretation of medical images, usually by radiologists. Secondary display systems can be used for showing imaging studies; they must not be used to prepare radiological reports.

The recommended specifications for primary display systems for diagnostic reading are a screen resolution of 1,500 x 2,000 pixels without pixel defects (Class 1), and a screen diameter of 50 cm. The display requires a graphic card that specifies exactly what luminance or density level should be produced for a certain input value, based on the Barten curve, which maps the values into a range that is perceptually linear. Color monitors cannot substitute monochrome displays for the interpretation of CTs. It's a question of image contrast, resolution, and human vision, particularly of male eyes. In general, gray-scale vision is better in all humans. Between 4% and 6% of the population, mostly men, suffer from color vision deficiencies.

■ On the Aunt Minnie website, I recently read the following quotation:

"The future is probably a ... solution, perhaps with standards-compliant HTML5 DICOM viewers and, crucially, with no plug-ins and no dependencies,' [the authors of a study] said. 'So you could look at DICOM [images] on anything from your TV to your wristwatch.'" [3].

Tablets and smartphones are beautiful image viewers for certain occasions, but they are amateur tools and don't and won't fulfill minimum standards for workstations used for clinical image interpretation. Neither will your television or your wristwatch.

I hear an immediate response: "Yes, but ..."

Such outcry isn't helpful. Many people confuse technological advancement with progress, but here we have an about-face, a return to inferior quality. The manufacturer of the DICOM reading software for iPads and iPhones is well aware of that, and they state in the small print: "Not suitable for primary diagnosis." Moreover, as a patient, I wouldn't like my personal data and images spread all over the place. Data should be kept safely in one single, secure storage area. Why not concentrate on something more useful – for the patients' benefit?

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Austria makes people happy Or: Is there anything new at ECR this year?

Peter A. Rinck



The column's title was a slogan of the Austrian Tourist Board when I was young and good looking. That was when Radio Austria still had a short-wave service and the station call signal consisted of the first nine tones of the Blue Danube waltz.

I thought about the slogan when I recently tried to prepare myself for ECR 2012 by making *Tafelspitz* at home. That's fundamentally sirloin cooked in broth. The first hurdle was that French butchers (I live in France) cut the meat differently – that is, the beef cuts on the shelf are not what they are in Austria. I got the cuts parallel to the muscle fibers, but they should have been perpendicular. At least that's what I believe.

Anyway, I boiled the meat for several hours in its broth. While it was simmering (boiling slowly I mean, not Simmering, the 11th district of Vienna) I checked the internet for the side dishes: horse-radish and apple sauce. There I stumbled over a description of Plachutta, the Burger King of Viennese kitchen:

"Plachutta really is an institution. Even by Austrian standards. In a town that has just embarked on the 5th millennium (that is: 5,000 years!) of its existence and has a long tradition of eating well (and eating lots!), the competition is understandably fierce and restaurants come and go... "

The internet is always good for surprises: Damascus is nothing, Jericho a plain youngster – Vienna, with Plachutta, is the oldest city of this world. *Bon appétit*.

■ For ECR and Vienna in March I also have a special coat, hat and gloves. The coat I bought in London 25 years ago, navy blue cashmere. It's warm because that's what you need in Vienna in March and it looks distinguished. I only wear it once a year: in Vienna. And for funerals in winter. At present, ECR in Vienna happens more often. The hat is a brown Borsalino; it's brand new (compared to the coat). The one before was a Stetson from Chicago (RSNA, a good

meeting) – which I lost it in a café in Vienna, or perhaps in a bookshop.

Taxi or subway in Vienna? It's not only a question of finances. The subway is cheap, fast, efficient, and clean. Taking a taxi means getting the latest news from the Balkans or right-wing Austrian views of the world. Both are entertaining. They open new windows to another world and new avenues to nowhere.

I even know a guy who walks all the way from his hotel in downtown Vienna to the Austria Center and back – it doesn't bother him when temperatures are below zero. He likes it, he told me. "You just need a comfortable pair of walking shoes." You also need stamina.

You need endurance too to weave your way through the crowded aisles of the commercial exhibition – it's not exactly my idea of amusement. Yet, it's one of the main reasons for many people, including me, to attend ECR: to get an impression of the latest products on the market.

The new specter of ECR: Ghostwriters paired with ghostspeakers.

The latest gadget of the meeting organizers is the introduction of ghostspeakers: together with your electronic slideshow you can submit a tape of your talk read by somebody else. This fits nicely with the commercial lunch and afternoon symposia with their scientific ghostwriters. I have gone into this in depth earlier [1].

The evening program today? Dinner first, Austrian or Italian. Then, exhausted from visiting the exhibition, to my wide and pleasant bed with Commissaire Maigret of the Paris "Brigade Criminelle". It will be a warm spring day in the book; exactly what I need. I bought the novel today, in English – sorry, *mes amis françaises*. I do not know whether I have read it before. I forget the contents of books extremely fast.

However, I remember pretty well if I have heard a lecture on a radiological topic years ago – and there are many of this kind. So let's see if there is something really new in Vienna this year.

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A dummy's guide to lecturing

Peter A. Rinck



Some things never change, among them that people want or have to talk to other people in public. ECR is such an occasion. Sometimes I watch the speakers before a session begins, and some remind me of myself - when I was younger and had not yet learned the skills of speaking to a mass audience. Even if your contribution is only eight or ten minutes long you don't sleep well the night before, your hands are sweaty, you stare forlornly at the exit, feeling sick, think about the meaning of life, want to sit down, or better still, go to bed.

I don't want to pretend that I am the champion, the master of the conference lecture. However, there are minimum requirements everybody can learn and follow.

A little stage fright is fine, adrenalin wakes you up.

For starters, nobody likes to give a talk in front of a group of people, at least I haven't met anyone who does. A little stage fright is fine, adrenalin wakes you up. Don't have two or three cups of coffee before a talk. That makes you nervous and increases other urges. A small whisky or a glass of wine can be good, but swaying from side to side or holding on to the lectern with both arms makes the audience wonder.

Golden Rules for Lecturing

■ **The audience is not your enemy, but your partner.** Some people have come to listen to you, others because they talk before or after you, some to sit in the semi-darkness to close their eyes and sleep. Stand straight behind the lectern, face your crowd – and not the screen with your slides. Perhaps even smile a little bit – and imagine in front of your inner eye how the people in the auditorium look in their underwear. It's a relaxing thought, as good as a glass of wine.

■ **Be dressed for the occasion.** A five-day beard and pants that look as if you have slept in them for the same period don't make a good impression; nor

are high heels and an evening dress the fitting items for the day.

■ **Know the topic you talk about.** If you don't feel secure, ask your peer to sit in the room, so that he or she can answer any question you don't feel comfortable with. A good head of a department will not leave a newbie in the lurch. He will accompany a newcomer from his department into the auditorium – or show up later and sit in the back.

■ **Use simple words in your talk, words you can easily articulate.** I remember invited lectures by a politically very successful professor of radiology who had his talks written by people from his department or from companies. Sometimes he couldn't pronounce some of the technical terms. It attracted attention, but not the right kind.

■ **Write your talk down yourself.** You should always have a manuscript for lectures with time constraints; then you stay within the given time limit. Type it in a way that is easily readable even in the twilight of the stage. Don't use the language of a scientific paper; on the other hand don't be too colloquial. Rehearse your talk. You don't have to know it by heart – although it might help. Find out how to pronounce words you are not sure about and have your English checked by somebody who knows. Nobody cares whether you have an accent as long as the contents of your lecture are good and people can understand you. This also means: speak up and don't mumble. Talk into the microphone. Practice how to react when you have a slip of the tongue. It doesn't matter. Just correct yourself and continue at ease. Stay with the text you have; don't try to suddenly add anecdotes or further explanations. You will be lost and your audience too.

■ **Be prepared for something to go wrong.** Always travel with two copies of your presentation or put a copy on the web so that you have a back-up. In the auditorium the light in the lectern will be broken, the laser pointer won't function, adapters won't fit, your slide presentation will be interrupted or belong to another speaker's talk, a video sequence won't start. Don't try to solve technical problems during

your talk. Continue without slides if you can – and have the chairman find a solution. If somebody in the first row talks on his *telefonino*, just stop your lecture and stare at him. Let's see what happens.

■ **Plan and put together your talk well in advance.** One slide per minute is enough; don't use more than ten slides for an eight-minute lecture. Listeners can't digest the same amount of information as readers can and their thoughts are prone to wander off. Give them a roadmap at the start, and offer them directions to where you are during your lecture. Good slides are simple and clear; they contain not more than five or six lines; use simple fonts such as Arial or Helvetica. Preferably, the background should be dark, the characters large and bright. Graphs and images should be simple. Do not put pictures of the citric acid cycle into your introduction or anywhere else into your talk. In general, the background should not resemble a flying circus: The use of animations such as flying arrows and cartoon ducks walking across a slide is not recommended.

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The European Commission strikes again

Peter A. Rinck



Years ago, I was invited by the then German President, together with a number of other scientists. It was a kind of garden party on a beautiful late spring day. The wife of the president was a medical doctor, a GP, and took care of her husband's health. I was introduced to her and we talked for a while; but when I started explaining the impact of magnetic resonance imaging and the progress in imaging diagnostics, she became cool and slightly dismissive.

After some minutes she abruptly moved on, walking down the lawn. At first I didn't understand why, then one of the President's staff explained to me that she believed in biomagnetism influencing daily life and, when traveling, she always arranged for her husband's and her own bed to be parallel to the magnetic lines in the bedroom.

I remembered this incident when I rewrote the chapter on safety of patients and personnel of an MR textbook [1] and checked some books and articles on biomagnetism in my shelves and on the internet. There I stumbled over two things: the accounts and suggestions of a number of people from Europe, Asia, and the United States about the influence of magnetic and electromagnetic fields upon the human body – and the "Directive 2004/40/EC of the European Parliament and of the Council of 29 April 2004 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)" and its later addenda [2].

**I share the view of Frederic the Great:
Let every man seek heaven in his fashion
– as long as he doesn't force his ideas
upon his fellow citizens.**

I share the view of Frederic the Great: Let every man seek heaven in his fashion – as long as he doesn't force his ideas upon his fellow citizens. This, for instance, includes the direction of his bed in the bedroom, her bed included. It's none of my business if some people believe that the best way to sleep is with

the head south because then the magnetic field of the body and earth are in harmony, resulting in mental rest and undisturbed sleep. It doesn't bother me when somebody states: "When elderly or with deteriorating brain functions one should sleep with the head towards magnetic north and not in a bed with a frame or springs that can be magnetized." *Chacun à son goût*, as the French say.

■ Magnetism is a phenomenon that is difficult to comprehend because there is no visible force; it is a good breeding ground for any belief in miracles, superstition, revelation, magic, or the supernatural – and pseudoscience. Parascience or pseudoscience often are coupled with angst, the fear of the unknown. According to the National Science Board, a US federal agency, belief in pseudoscience is widespread and continues to thrive [3].

What bothers me is when people try to impose their pseudo-scientific views and half-baked rules on me. Reading the new EU directive on magnetic resonance is an eye-opener of how far estranged the members of the European Parliament and the civil servants in Brussels are from daily life and their responsibilities to the public they should serve. The EU directive would help close down all MR facilities in the European Union because nobody would be allowed to work close to an MR system.

The real background of the EU directive is difficult to fathom. I do not know whether this proposal happened by oversight, lack of knowledge, or by other possible reasons I don't want to mention because it wouldn't be politically correct.

Without doubt, there are numerous open questions concerning the safety of MR imaging, mostly at fields beyond 2 Tesla. Ultrahigh-field equipment has for example heat deposition and noise problems. Certain other questions are open and caution might demand further research on possible adverse effects at high field strengths. Still, to date, there is no proof of any permanent damage to patients or staff caused by the magnetic or radiofrequency fields of commonly used clinical MR equipment. The measures envisaged by the European Parliament and the European

Commission are plainly prophylactic, precautionary: perhaps something could happen, they argue.

■ In 2010, the mess created since the late 1990s was inherited by the new EU Commissioner of the Directorate-General for Employment, Social Affairs, and Inclusion and his cabinet. Nobody there has nor had any background on the topic, otherwise they wouldn't state "The rules are to protect workers like doctors and nurses giving patients magnetic resonance imaging scans (MRI), people working with radar, welders, and workers repairing power lines." [4]

Thirty years ago, I was sent by the head of my department to the first meeting of the (German) national radiation protection agency dealing with magnetic resonance. I was in my late twenties. All other men around the big conference table were at least thirty, some forty years older. I was the only one who had ever seen and worked with MR equipment. The question was: what could be the possible hazards?

I remember two participants who tried to monopolize the others with statements about soldiers and the dangers of radar beams. There is a difference between magnetic resonance, industrial welding, and radar. The occupational hazards are also completely different. One cannot create one big ideological hodge-podge and decide the same rules apply for everything under the sky. Still, the EU tries.

There is always carping and criticism about great and anonymous administrations. In 2000, I wrote down my personal experiences with the European Commission – applying for a university research grant and working as a scientific expert [5]. Afterwards I never worked for or applied at the EU again. My general picture about the qualifications and the competence of the European Commission and the European Parliament has not changed. They are costly and harmful. All over the world people suffer, perhaps even die because of bureaucrats. Still, we have to live with them. But it's always better to steer clear of them as long as we can.

If the new EU directive comes into effect, no – or only limited – MR examinations could be offered to patients any more; they will be pushed into getting x-ray examinations. Yet today, plain or computerized x-ray equipment would fail in any approval procedure because of the known and proven radiation danger.

There are many lobbyists and union leaders from all over Europe involved in this new European-scale

law. They have their own agenda. It is unfortunate for the new Hungarian EU Commissioner that he and his crew will be held accountable – he might be hanged for other people's mistakes. At present, he has to find a way out of the seeming dead-end without losing face, stepping on too many toes, and making too many waves in the media.

What would be a face-saving solution for both sides? Suspending the directive until the facts are on the table and the political gambling and bickering has ended. Why not arrange a European-wide study on possible side effects of MR imaging to answer the still open questions? Money is no problem for the EU.

Such a study will easily take eight to ten years. In the meantime, many of the people in Brussels and Strasbourg will have moved on to new sinecures, back to Autobahnia or Ruritania, or they might have retired. Time is an excellent healer and some of the mistakes made will be forgotten and forgiven. And it will show whether 3 or 7 Tesla machines are really no hazard to patients and staff.

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Can we learn the art of good leadership? A wise old man's advice.

Peter A. Rinck



Alexander Margulis was born in 1921 in Belgrade. In 1950 he graduated from Harvard Medical School. Thirteen years later he became professor and chairman of the department of radiology at the University of California, San Francisco, stayed there for 26 years, and turned the department into the showcase of U.S. radiology. Since 2000, he has been professor of radiology at Weill Medical College of New York's Cornell University. Margulis is an honorary member of many radiological societies throughout the world. His impressive CV fills a small booklet.

He was *the* professor of radiology. I remember how honored we were when we arranged the first conference on the rational use of MRI, held in Switzerland some 20 years ago, and Margulis contacted and endorsed us – and gave a well-founded and well-balanced opening lecture. He advised many institutions and foundations, and one would meet him at most major and many minor congresses all over the world – indefatigably, friendly, urbane, sophisticated. Until today, nobody has truly replaced him as the global leader of radiology.

He has written several books. Today I want to write about one he published in 2011, perhaps for his 90th birthday: "How to rise to the top ... and to stay there!" [1]. It's the last in a series of three; they are not his memoirs – although personal experience shines through – and have little or nothing to do with radiology or medicine at large. This last book is about leadership, a business and career manual, seasoned with the ideas of Sun Tzu, Clausewitz, and Machiavelli – and the American way of life.

Margulis' book covers all basic questions – and, more so, questions you never thought about or dared ask.

The book covers all basic questions – and, more so, questions you never thought about or dared ask. He describes basic administrative hierarchies; the impor-

tance of mentors; the different paths of career advancement in academia and business; whistle blowing, transparency, and computer literacy; doing well in a job interview; how to choose between job opportunities; gender, dress, physical appearance, even offices and furniture.

He also covers the common topics of politics: "Be always friendly and courteous with everyone, no matter what their position is, and never gossip." And: "Be very careful in choosing friends. Wrong choices will hurt you." He talks about how to make your new chief an ally in building your career and what to do if your chief wants to get rid of you.

Economy, friends, societies, marriage, family: everything is considered; as is how to run meetings, selecting one's deputies, gaining respect, conflicts of interests, hiring and firing, entertaining visitors and employees in restaurants or elsewhere – and how to arrange your private and social life.

Among the pros of climbing to the very top of the ladder, Margulis points out: "The government, or even the country's president, may ask you for advice ... you may be invited to address international gatherings such as the World Economic Forum meeting in Davos, Switzerland." But there are cons too: the loss of freedom and the destruction of your family, for instance.

■ Many years ago, I read a book on the same topic, though it was written in a completely different way. The title is "How to succeed in business without really trying", and the author is Shepherd Mead [2]. The book describes the step-by-step business career of a fictional character, J. Pierrepont Finch, and was turned into a very successful Broadway musical comedy and won, among many other awards, the Pulitzer Prize. Mead joined Facebook on 22 April 2010 and died in London on 15 August 1994.

However, like the Bible or the Talmud – it's all a question of exegesis, or interpretation. Mead's book was a satirical description of the ascension to the top;

Margulis' guidance and instructions are a serious primer – or does he take the reader for a ride? No doubt, his collection of observations and advice is comprehensive, and he paints the ideal picture of the benevolent ruler of a company or academic institution, but in most instances in real life this paint has long come off.

■ More so, I doubt whether one can learn leadership from the book of a unique personality – either you are a born leader and have the ingredients in you, or you don't. If the readers possess them, they will profit from Margulis' advice. However, for the rest, the sad conclusion remains: As acquiring an MBA doesn't turn the student into a good manager or businessman, reading this book won't make you a leader. I imagine that Margulis knows that too. Otherwise there would be hundreds of Margulises around in radiology. Still, this treatise is exquisitely informative and entertaining even if the reader doesn't have the qualities or plainly doesn't want to become a leader.

And there is the other side of the coin, the gap between reality and theory; you just have to look around – as Shepherd Mead puts it in the first lines of his book:

"Let us assume you are young, healthy, clear-eyed, and eager, anxious to rise quickly and easily to the top of the business world. You can! If you have education, intelligence, and ability, so much the better. But remember that thousands have reached the top without them. You, too, can be among the lucky few."

Does the same hold true for radiology? No doubt!

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Europe celebrates the forgotten pioneer of MRI – Dr. Erik Odeblad

Peter A. Rinck



He still works, although mostly in his study at home. Four months ago he celebrated his 90th birthday. This year is very important for him, he says, in several aspects: It is 60 years since the Nobel Prize was awarded to Felix Bloch and Edward M. Purcell, the two pioneers of NMR in physics. Also, he and his wife Anne-Marie have been married for 60 years. They have four children, 10 grandchildren, and – "so far", he says – two great-grandchildren.

Erik Odeblad was born on 31 January 1922 in Kristinehamn, Sweden. After attending medical school in Stockholm, he started working as a physician at the Karolinska Institute in 1952. Also in 1952, he defended his first doctoral thesis. It was his 22nd publication and led to his appointment as associate professor at the Karolinska during the same year. In 1953, he was a Rockefeller Foundation Fellow at the University of California, Berkeley.

In Stanford, on the other side of San Francisco Bay, he met Felix Bloch. Odeblad asked him whether he could use his NMR spectrometer to study human samples, but Bloch's response was negative. He made it clear that NMR was a tool for physicists, not for research into physiology, medicine, or biology. Odeblad returned to Sweden and got his own machine.

This sounds easy on paper, but there were no commercial NMR spectrometers at that time. If you wanted one, you had to build it yourself. Sture Forsén, a well-known Swedish professor of chemistry, remembered in a review of his professional life:

"The first two commercial NMR spectrometers arrived in Sweden in early and mid-1957. ... These instruments were actually not the first NMR spectrometers in Sweden. Dr. Gunnar Lindström of the Nobel Institute of Physics in Stockholm had, around 1950, built his own instrument. His magnet was of such good quality that he actually was one of the first, if not the first, to report proton NMR chemical shifts – between water and CH₂/CH₃ groups in mineral oil. Lindström's spectrometer was later modi-

fied by a Swedish medical doctor, Dr. Erik Odeblad, who used it for his pioneering biomedical NMR applications in the mid-1950s."

**In December 1954,
Odeblad and Lindström submitted their
first NMR results – they had found out
that different tissues had distinct
relaxation times.**

In December 1954, Odeblad and Lindström submitted their first NMR results; the paper, entitled "Some preliminary observations on the proton magnetic resonance in biological samples," was published in 1955 in *Acta Radiologica*. They had found out that different tissues had distinct relaxation times, most likely due to their water content but also to different bindings to lipids – a phenomenon that explains tissue contrast in MR imaging. Some 60 scientific papers on MR in human tissues and secretions of mucous membranes followed between 1955 and 1968. Dr. Paul C. Lauterbur who received the Nobel Prize in 2003 for his invention of magnetic resonance imaging once commented:

"The possibility of observing interactions of water with living tissues had attracted occasional investigators over the years. Perhaps the most indefatigable was Erik Odeblad, who was fascinated by the opportunities for characterizing the properties of human cells and secretions, and by the technical problems of observing NMR signals from small biological samples."

Odeblad continued his career as intern and resident in obstetrics and gynecology at the Sabbatsberg Hospital, Karolinska Institute, in Stockholm from 1954 to 1961 and stayed as research fellow of the Swedish Medical Research Council at the same institution from 1961 until 1966. During this period, Odeblad developed a method to obtain and analyze mucus produced in single crypts without contamination

from other crypts in the cervix and wrote a second doctoral thesis, this time in physics. The same year, he was appointed professor of medical biophysics at the new Umeå University. He retired from this position in 1988 and remained as emeritus professor at the same department, which today is the department of medical biosciences.

■ Odeblad is a very humble man. Many NMR scientists did not, and still do not, know of him, because they entered the arena of medical NMR thirty or more years after Odeblad's pivotal paper. Thus, he was never included in the conferences on MRI or MR spectroscopy. This may also be connected to the topic of his research: fertility. Finding out more about the propagation of humans is not mainstream research, not being part of the three "Big C" research themes: cancer, cardiac, circulation. Thus, his research has rarely been referenced in NMR or MRI circles.

■ There is one person who completely avoided any citation of Odeblad's papers, but was very much aware of him. Years ago, Odeblad was contacted by a lawyer in New York. They had a 50-minute conversation. Odeblad was asked to admit that he never performed NMR studies of malignant tissue. The lawyer wrote an official legal protocol. A doctor from Brooklyn wanted to be the first in medical applications of NMR; he had jumped on the bandwagon more than 15 years after Odeblad. The American is well known as an unceasing self-promoter with a grandiose sense of his own importance. He tried to play down Odeblad's achievement and put him into the shade. He nearly succeeded.

The assignment of credit on the basis of intensive publicity rather than on the basis of a fair and accurate analysis of the historical record is a growing deplorable trend in modern science.

■ On 25 May 2012, Dr. Erik Odeblad received the European Magnetic Resonance Award 2012 in a special ceremony in Umeå, Sweden. The two prize categories – one in Basic Science, the other in Medical Sciences – were combined into a single one. Odeblad was not the only one with a happy face in the room; members of the Swedish scientific community attending the presentation were clearly gratified that their colleague was finally being recognized. So was his family.

Better late than never.

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Generation Y and the future of radiology

Or: Is Generation Y outsourcing cerebral activities to smartphones?

Peter A. Rinck



Generation Y, born between 1981 and 2000, has been called the *copy-and-paste generation* who are "living while working" [1]. Some observers even think vocation in medicine is being replaced by an engagement in the health system as a means of obtaining a not-too-burdensome livelihood. What's the truth about young doctors?

I must start here with a disclaimer: Don't shoot the messenger. I only relay what I was told and what I have read and observed.

Early this year I wrote a column about smartphones and the change of doctors' bedside manners [2]. The feedback for the column was considerable. For many people, the little black machines (LBMs) in the hands of younger colleagues seemed to be a bone of contention, but they didn't dare voice this in public. Still, they were aware that some of their younger colleagues become so engrossed in their LBM that they neglect their tasks – and, where face-to-face patient or general human relations are concerned, many of the LBM users are at a loss.

Then, for four or five months, there was a trickle of more comments and footnotes during conversations. Taken together, they widened the topic. The LBM obsession was seen as only one symptom of the changes in the social dynamics of healthcare systems, be it in hospitals or private offices.

Hospital life and teamwork reflect a change in traditions. Bedside manners must adjust to new attitudes, as must the entire social interaction among colleagues and hospital administrators – and attitudes toward patients. Never forget that patients should come first, not administrators.

A new generation of radiologists has arrived and starts climbing the career ladder. While watching them, everyone hopes that they would have learned from the successes and mistakes of the past. They have, but not like we imagined. Things turned out differently. Reality is a poor match for dreams.

I have followed the topic of social and organizational dynamics for some time. It is multi-layered and rather complex. It boils down to three main points that go hand in hand. First, there is a new generation moving into all medical disciplines. Second, there are fewer highly qualified doctors than our European and North American societies need in order to maintain the existing health system, and this is not limited to medical imaging [3]. Third, there will be a majority of female doctors [4].

"First, there is a new generation moving into all medical disciplines; second, there are fewer highly-qualified doctors to maintain the existing health system."

■ Today's younger working generation is known as "Generation Y"; the Y doesn't stand for young, but Y follows after X in the alphabet, and the sequel is Generation Z. Generation X (born between 1965 and 1980) replaced the first generation after World War II, the baby boomers (1946-1964). The baby boomers grew up and lived to work and replace what had been destroyed and lost during the war. Generation X worked "to live and have fun" and is consequently called *Spass-Generation* (*fun generation*) in German.

During the last two years one started stumbling across articles about Generation Y in the professional journals of many medical disciplines – surgery, ENT, anesthesiology, GP, even hospital administration – from Australia to Canada to the United Kingdom. To date, I haven't found any discussion in radiological journals. The journal articles are mostly balanced, trying to describe the arising situation and pinpointing possible adaptations of the health system.

The only ones being prepared to cope with the emerging development seem to be the marketing departments of the radiological manufacturers and a number of congress organizers; they respond to and

try to exploit the new characteristics and traits to sell to the younger doctors.

The transition from one generation to the next has never been easy. The combination of an independent young generation that grew up in comfort and affluence, pampered and overprotected by their parents, exposed to the digital revolution in a period when quality of school and university education declined, is seen by many sociologists and psychologists as a possible threat to the existing stable society and workplace structures.

The authors of most articles agree on several points: Vocation in medicine is being replaced by an engagement in the health system as a means of a not too burdensome livelihood. The young doctors appreciate competence, but want flat organizations. The hierarchies of the baby boomers (and Generation X) are no longer accepted. On the other hand, baby boomers generally view Generation X physicians as less committed to their medical careers [5]. The standing of Generation Y will be even worse.

The two older generations engaged in the workforce have a routine grasp on new technologies, but they prefer books and can read and digest longer treatises. Generation X slowly unlearned arithmetics and orthography, Generation Y – people fear – outsources their cerebral activities to their LBMs – their smartphones and tablets. Generation Y uses all kind of digital devices permanently, but the absolute majority consists of passive users, not active ones. They prefer short, easily-written texts, if possible on screen. They play with apps, but cannot create websites on their own. They lack analytical thinking and do not understand the fundamentals of technologies and, for instance, the way of action of sophisticated medical imaging techniques such as molecular imaging compounds, MR imaging, or ultrasound. They are consumers.

Because there is a lack of physicians in many countries, their bargaining position is excellent. They know their value and don't sell themselves short. The employers have to fill the openings somehow, thus they have to compromise.

■ The German surgeon Christian Schmidt put it bluntly: "Employers cannot ignore the needs, desires and attitudes of this vast generation." [1] Or, put even more brutally, times have changed. The heads of departments or hospital administrations cannot terrorize

the residents any more – no more 36-hour shifts. Nowadays the residents have the say. They say: kindergarten, parental leave, flexible work hours, additional unpaid holidays, no overtime, or if overtime: cash on hand. Generation Y doctors are not afraid to question authority, or to abruptly quit their job. The older generations describe this as lack of loyalty, the younger ones talk about "re-orientation", looking for "new challenges". However, they don't like stress. If they cannot stand their superiors or their work environment, they don't try to adapt but leave: "I don't have to put up with this."

According to Schmidt and his co-authors, many hospitals already need 2.5 positions for what used to be done by one physician some years ago. However, there are already 12,000 open positions in Germany alone. The fight between different employers will become fierce. In this context, the German author makes a quite harsh statement: "The quality of training appears to be the critical factor in a clinic's recruiting process. At the same time, the suitability of candidates is decreasing." [3, 6] Pragmatic and unpleasant solutions in the health system with a negative impact on future patients will follow.

One should never tar an entire group – in this case Generation Y – with the same brush. However, most arguments and observations are repeated in conversations and in articles from several countries. The consequences and implications of these changes are not foreseeable yet.

The normal reaction in such situation is to look for somebody to blame: "Let's put the blame on Generation Y." However, it's not their fault. They grew up in an environment whose rules they followed; it's not their fault that values and education changed and declined, it is an evolutionary process they were born into.

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Total reliance on autopilot is a risk to life

Peter A. Rinck



On 1 June 2009, an Air France aircraft plunged into the Atlantic en route from Rio to Paris, killing all 228 people on board, after flying through turbulence. In the final report of the accident, the analysts stated the co-pilots who were at the controls of the Air France jet at the time of the crash had not been trained to fly the aircraft in manual mode, or to promptly recognize and respond to a speed sensor malfunction at high altitude.

The investigative panel's final report, released in July 2012, said there was a "profound loss of understanding" among all three pilots about what was happening after the autopilot disconnected. The pilots then struggled to control the plane manually amid a barrage of alarms – a situation further confused by the faulty instructions displayed by an automated navigational aid called the flight director [1].

Where is the connection to radiology? There is no major accident with hundreds of dead patients and operators in radiology, but hundreds of thousands of partly or completely wrong diagnoses do occur. According to the literature, error rates range between 3% and 5% in general radiology and between 30% and 90% in mammography and detection of lung cancer [2].

To err is just human, even in medicine – however, the error rate should be kept to an absolute minimum.

To err is just human, even in medicine – however, the error rate should be kept to an absolute minimum.

The question is – and I can't answer this question – whether the assessment of images or the final diagnostic report will suffer from a more superficial approach to dehumanized medicine in which priorities have changed from man to machine, where human beings are no longer the No. 1 priority number.

I recently stumbled across a book that has nothing to do with radiology – or perhaps very much so. The

book's title was "Alone together: why we expect more from technology and less from each other" [3]. The author, Sherry Turkle, is a clinical psychologist and professor of social studies of science and technology in Boston. It made me curious. It is about the change in relationships between people caused by technology.

In radiology, for instance, PACS and the transmission of radiological reports by intranet or Internet have sped up communication, but they have also destroyed much of the personal contact between radiologists, their technicians and referring colleagues, and patients. There is no human being at the end of the line but rather a machine.

More so, image processing replaces the radiologist's brain and knowledge. Lateral thinking and integrating the patient's history often help more than an increased quantity of processed images. Computer-aided detection (CAD) takes away creativity and consideration. No doubt, CAD and all the connected gadgets have advantages – as long as one remembers and knows how the concepts and the lines of thought were before they were introduced. Getting used to them makes us lazy. They should be only the "little helpers." Not understanding how they manipulate the original data is dangerous.

■ Radiologists too should know how to fly manually – without letting their mental medical skills erode. Total trust in the higher efficacy and efficiency of computers might suddenly turn into a deadly illusion.

Always remember "The Sorcerer's Apprentice" – either the poem by Goethe or Mickey Mouse in the animated movie "Fantasia" by Walt Disney: "Rid me, sir, of the spirits that I called!" The genie we let out of the bottle is on the loose now – and what can happen in this case you see in Disney's cartoon.

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Never mind the fashion, let's get personal

Peter A. Rinck



Once again, one of the topics at this week's annual meeting of the RSNA in Chicago will be personalized medicine. It's a term on everyone's lips, yet everyone seems to mean something different.

Dr. James H. Thrall, from the Department of Radiology, Massachusetts General Hospital, Boston, described it in 2004:

"The age of personalized medicine is underway. Each individual is now an 'n' of one [1]."

Also in 2004, Dr. Henry Wagner, a pioneer in the field of radioisotope imaging, lauded personalized medicine at the annual meeting of the (US-American) Society of Nuclear Medicine: "I envision [a database] where everyone will have a periodically updated portable electronic record that contains lifetime manifestations of his or her state of health," he said. "Rather than trying to give a name to a patient's disease, putting him or her in a disease 'box,' the person's electronic health record will reveal all the 'manifestations' of the patient's health and illness. The manifestations on a patient's 'health chip' can be automatically compared ... to characterize illness, predict what is likely to happen, and suggest possible treatment [2]."

"The implanted 'health' chip is the future of personalized medicine. "
Is it really?

Personalized medicine is described as an inevitable trend and the personal health chip is closely connected to it.

Detailed systems have been worked out. One was proposed by Dr. Eric Topol in a book about the arrival of personalized medicine published last spring [3]. He concentrates on a chip embedded in or attached to patients' bodies. The chip will receive all information about genetically caused, infectious, or other diseases and their response to pharmacological treatment. Based on the patients' complete genome

the stored information can be processed and interpreted by their smartphone, which also proposes treatment decisions. Other decisions will be made by the patients themselves, only a few by physicians. In the World Wide Web patients have access to the latest medical information and decide on treatment based on the freely available medical literature – the author describes this as the "democratization" of medicine.

Topol is convinced that with the knowledge of an individual's complete genetic structure and its variations and mutations from what is believed to be normal, prediction of diseases and their prevention or therapy will be possible and pharmaceutical treatment straightforward. According to his book, it will also "reboot" the pharmaceutical industry.

Dr. Aaron Ciechanover, who received the 2004 Nobel Prize in Chemistry, also has no doubt that custom-tailored therapy will evolve soon [4]: "Just think of how differently the same cancer can progress in different people. But still they all receive the same treatment – often with uncertain outcomes."

Ciechanover is more balanced, but he too misses the point: Knowing the cause of a disease does not mean that you can treat it. More so, there are numerous other points usually missed, among them the multiple variations of genetic mutations reflected in traits and the myriad of different additional factors contributing to the outbreak of a disease.

■ In a letter to Science, Daniel W. Nebert and Ge Zhang enlarge upon the great hopes placed in personalized medicine and individualized drug therapy [5]. Their article is short, straightforward, scientifically argued, and to the point. They close: "However, the idealistic goal of personalized medicine and individualized drug therapy, which needs a holistic understanding of each individual patient's unique -onomics read-out [i.e., genomics, proteonomics, transcriptomics, metabolomics, epigenomics] is most likely unattainable – by advances in technology alone."

In my opinion, it is also bold arrogance if researchers outside the medical field talk about their new invention of "personalized medicine" – for centuries,

physicians have dealt with their patients in a personal and individual way. They study their patients' history and symptoms and offer their expert advice. Generally, patients get empathy, attention, perhaps even affection from their doctor; they are not just numbers on spreadsheets but human beings [6].

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