

SWISSQUOTE

FINANCE AND TECHNOLOGY UNPACKED

TRANSPORT
Flying taxis
are taking off

MEDARTIS
The art
of mending
broken bones

LIFTS
Moving ever
upwards



DOSSIER

INSIDE A TRADER'S MIND

The advent of neuroeconomics
Profiles of seven iconic traders
Artificial intelligence vs. the human brain

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Trader blues



By Marc Bürki,
CEO of Swissquote

If you're unfamiliar with big banks' trading rooms, you would be shocked to see that they are now completely different than the clichéd image you might have in mind. I recently visited one in Frankfurt, as big as a football stadium holding a thousand employees, and was quite surprised to note the almost religious silence in the entire room.

Palpable anxiety, incessant noise and cigarette smoke have all been replaced with cold concentration, austerity, and apparent calm... Make no mistake: a trader's job is still intensely stressful, as described in this issue's **feature**, but it has changed over time. Now, traders are more like aeroplane pilots, whose mission is to manage many parameters to maintain a set course.

p. 38

All this to say that traders, collectively, probably don't deserve their bad reputation that is nevertheless propagated by a few romantic – and media – figures. This issue focuses on **portraits** of some of the most illustrious traders, in turn geniuses and gangsters, and sometimes both. The result is a fascinating sample, as we chose to include

p. 50

investors in the largest sense such as the great Warren Buffett.

As we dove deep into the minds of traders, of course we also had to explore the latest developments in neuroeconomics. This discipline, based particularly in functional neuroimaging, studies the psychology of investors to better understand their decisions. Surprisingly, trading firms aren't (yet?) looking into this, even though many studies are shining instructive light on our many cognitive biases and other behavioural anomalies. Is it true what Paul **Glimcher**, the American star of neuroeconomics interviewed in this issue, says: "Traders don't like to be test subjects"?

p. 48

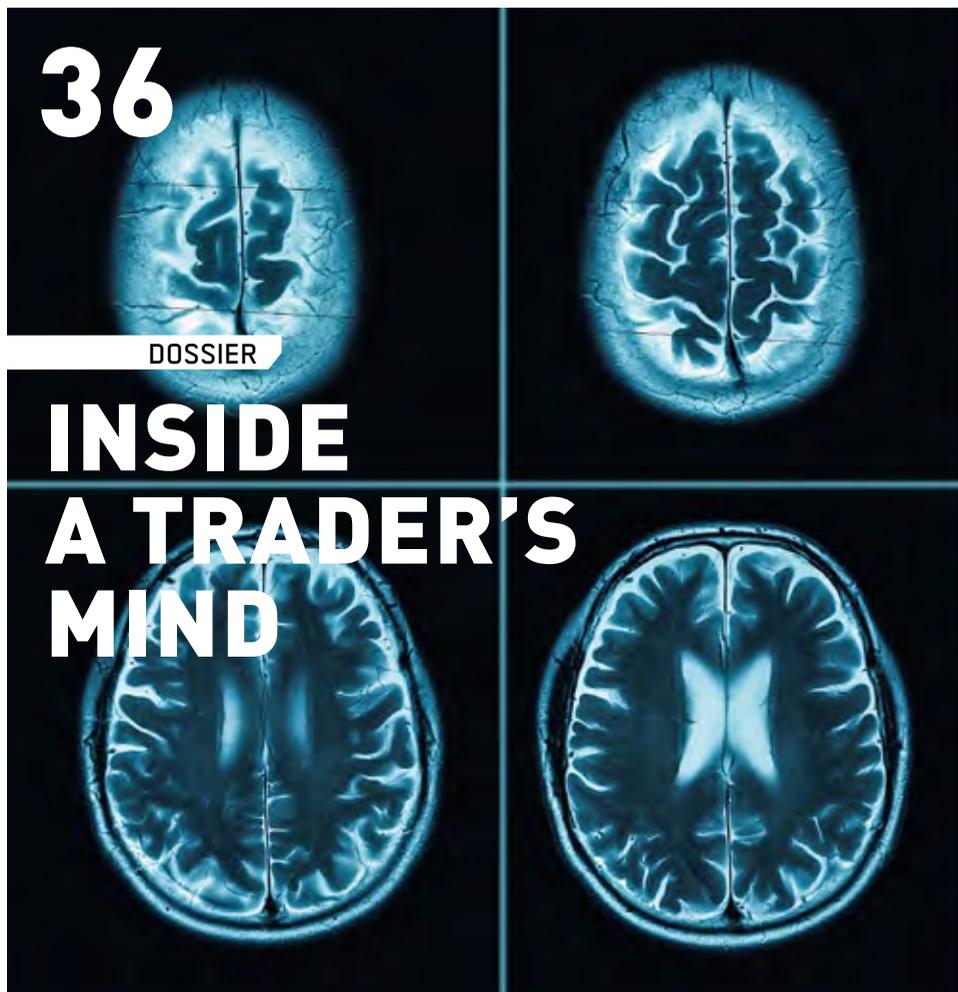
But Glimcher is honest in saying that these tools could never be used in a trading room... While neuroeconomics makes it possible for traders to know themselves better and potentially improve their work, on the other hand, progress in artificial intelligence has come to question their entire raison d'être. As you can see, there is little respite for traders.

Happy reading!



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ERRATUM
In our previous edition, in the article on BioCan, we mistakenly published a photo of the former director of the company. Our apologies to those concerned.

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SCANS



“I’m surprised that Brexit didn’t have a more dramatic effect”

Lloyd Blankfein, CEO of Goldman Sachs, stated that the consequences of Brexit on London weren’t as negative as he expected.

automobile

GEELY USING AN ARMY OF ROBOTS



Chinese automaker Geely sold 1.2 million vehicles in 2017.

KUKA

Chinese group Geely has just opened a new factory north of Beijing for its auto brand Lynk & Co. This production facility, which cost 12 billion yuan (1.9 billion Swiss francs), will manufacture all-terrain vehicles. Vehicle manufacturing will be almost entirely carried out by

300 robots, supplied by Germany’s Kuka and Switzerland’s ABB. Another similar factory will open next year in Belgium. But success is not guaranteed – US-based Tesla has also tried to automate its factories, but it led to significant production delays. — GELYF — ABBN — KU2

entertainment

PREDICTED DEATH OF THE FILM PROJECTOR

Samsung has begun installing LED cinema screens in several Asian cities, including Seoul and Shanghai. The quality, contrast and resolution (4K) of the image are significantly better than a traditional projection system. The colours are also more intense. The Samsung LED screen for 3D films has also been installed in the Sihlcity cinema in Zurich, the first of its kind in the world. But this innovation does not appeal to everyone. Several filmmakers such as Steven Spielberg and Christopher Nolan are condemning the fact that film projectors are being replaced by this technology, which has been inherited from television.



SAMSUNG



\$45,000 BN

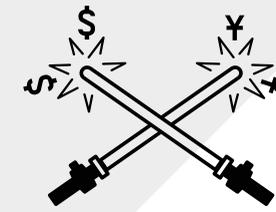
The amount that flies under the radar of official financial institutions, according to the Financial Stability Board. This money is monopolised by shadow banking.

pharma

PATIENTS DIAGNOSED REMOTELY

In late April, Novartis launched an app called FocalView, developed in partnership with Apple’s ResearchKit platform. The app will allow people with vision diseases to understand their symptoms in real time. The pharma group has several ophthalmological treatments in its portfolio and hopes to use them to conduct clinical trials. This application will make it possible to increase the pool of patients that could participate in studies, to collect data that better reflects their actual conditions and to more precisely monitor the progression of their illness.

— NOVN — AAPL



-28%

This was the drop in direct Chinese investments in the United States in 2017. They fell to \$43.5 billion. The decrease is a reflection of the trade war between Washington and Beijing, as well as attempts by the Chinese government to restrict capital outflows.

transport

SUPERSONIC FREIGHT



In April 2018, Virgin Hyperloop One introduced a new version of its cargo transport capsule.

VIRGIN HYPERLOOP ONE

Virgin Hyperloop One, the start-up led by Richard Branson and created to develop the supersonic train dreamt-up by Tesla founder Elon Musk, has partnered with Emirati port operator DP World. They aim to establish a supersonic line that would be able to travel the 150 kilometres sep-

arating Dubai and Abu Dhabi in 12 minutes. They also want to create an express freight network made up of pods in an underwater tube moving at 1,200 km/h. This will first be tested in UAE before expanding to India.

— DPW

RANKING

THE 5 BEST SELLING MEDICATIONS IN EUROPE
(by 2017 revenue)

1. HERCEPTIN FROM ROCHE to treat cancer
€5.9 BILLION
2. AVASTIN FROM ROCHE to treat cancer
€5.6 BILLION
3. XARELTO FROM BAYER to treat blood clots
€5.3 BILLION
4. EYLEA FROM BAYER AND REGENERON to treat macular degeneration
€4.9 BILLION
5. LANTUS FROM SANOFI to treat diabetes
€4.6 BILLION

Source: GEN

TOP 5 PERFORMING COMPANIES IN 2017
(by revenue)

1. WALMART
\$486 BILLION
2. STATE GRID CORPORATION OF CHINA
\$315 BILLION
3. SINOPEC
\$268 BILLION
4. CHINA NATIONAL PETROLEUM
\$263 BILLION
5. TOYOTA MOTOR
\$255 BILLION

Source: Fortune

TOP 5 COUNTRIES DOMINATING INVESTMENTS IN SOUTH-EAST ASIA

(by percentage of total invested between 2011 and 2017)

1. JAPAN
20%
2. OTHER COUNTRIES IN SOUTH-EAST ASIA
17%
3. CHINA
14%
4. UNITED STATES
10%
5. SOUTH KOREA
9%

Source: Financial Times

SCANS



550 million

The number of Chinese passengers who flew on an aeroplane last year. In 2007, it was only 184 million. In the next five years, China will surpass the United States as the largest aviation market, according to the International Air Transport Association.

STEVE MARCUS / REUTERS



Director of business at YouTube, Robert Kyncl, presents Red platform, which tackles the ultra-competitive paid streaming market.

entertainment
YOUTUBE LAUNCHING ITS PAID PLATFORM

YouTube Red, which has been tested in the United States since 2015, will now be available in more than 100 countries. For \$9.99 per month, users have access to an advert-free online video portal, exclusive content as well as the Google Play Music streaming service. YouTube hopes to compete with other paid platforms such as Netflix, Amazon and Spotify. But it is suffering from the negative publicity generated by some of its star YouTubers, including PewDiePie, who has been accused of racism, and Paul Logan, who was heavily criticised for making fun of a suicide and using a taser on a rat.

— Google



“Such powerful tools also bring with them new questions and responsibilities. How might they manipulate people? Are they safe?”

Sergey Brin, co-founder of Google, on artificial intelligence.

entertainment
THE TOY INDUSTRY IS LOSING ITS MARBLES

Toys R Us' bankruptcy will have negative consequences for many toy brands. Mattel made 15% to 20% of its US sales from Toys R Us. Hasbro also depended heavily on the toy store. Toys R Us owes the brands \$135 and \$59 million respectively. Other brands fared better,

such as Denmark's Lego, whose revenue increased thanks to the film about its plastic characters. Canada's SpinMaster is also less impacted, as its toys are sold in bookshops, supermarkets and drugstores.

— Mat / Has



“We are moving from a product-centric to an experience-centric economy and it's changing the full range of products that companies are creating”

Bernard Charles, CEO of Dassault Systèmes.



RICHARD B. LEVINE / NEWS.COM

food
BELL IS HAVING MORE GREENS

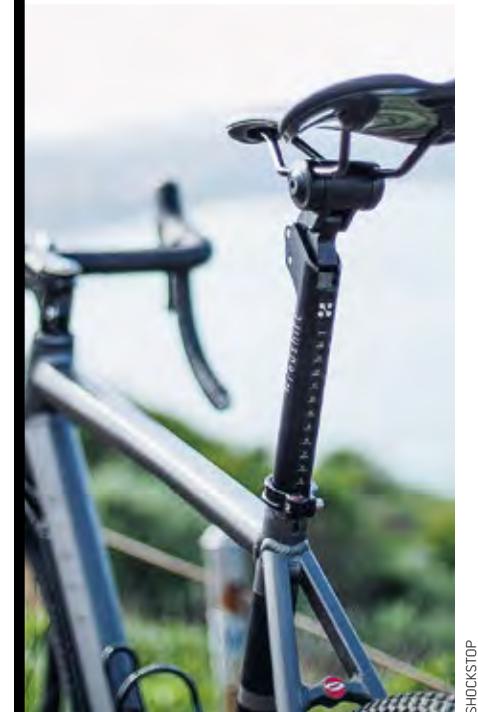


ISTOCK

Bell, Switzerland's meat leader, has acquired Vaud bagged salad producer Sylvain & Co, via its subsidiary Eisberg. The acquisition will make it possible for Bell to increase its share in the booming fresh prepared food market, which already makes up one-sixth of its revenue at

627 million Swiss francs. Eisberg has factories in Switzerland, Poland, Hungary and Romania. Each year, its 1,100 employees produce 34,000 tonnes of ready-to-eat vegetables, fruits and salads. The products are sold in 12 countries, mainly under the Gastro Star brand. — Bell

KICKSTARTER



SHOCKSTOP

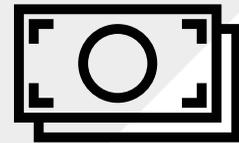
SHOCKSTOP

Biking without shocks

ShockStop is a flexible seatpost for bicycles. It absorbs shocks to reduce their impact on the rider's back. The force is reduced 60% compared to a traditional rigid seat. The accessory, which is compatible with most bikes, has a spring that can be adjusted based on the road conditions and the rider's weight. The US start-up that developed ShockStop, Redshift Sports, has also created a suspension handlebar stem. The two can be used together.

FUNDS RAISED
\$430,129

AVAILABLE
NOVEMBER 2018



\$1

This is the salary that GoPro CEO Nick Woodman will receive in 2018. Two years ago, he made \$800,000 with a bonus of \$300,000. But the company isn't doing so well: it has to lay off 250 employees and its share price has fallen by almost one-third in a year, due to disappointing sales.

distinction

SWISS LAUDED BY ITS EMPLOYEES

Swiss is the company with the best working conditions in the country, according to a survey of Swiss employees conducted by hiring agency Randstad. It is followed by Zurich airport, watchmaker Patek Philippe, luxury group Rolex and Schwyz-based knifemaker Victorinox. Biel's Swatch came in sixth. Among the criteria examined were job security, salary, work-life balance and career opportunities. Google's Switzerland branch had come in first place for the previous three years. — LHA

petrol

WIDESPREAD CORRUPTION IN NIGERIA



SHELL

ENI and Royal Dutch Shell are both involved in large-scale corruption. The two petrol groups spent \$1.3 billion in 2011 to obtain the right to an offshore field in Nigeria that was supposed to contain \$9 billion worth of barrels of black gold. But 85% of the money ended up in the pocket of a Nigerian

ex-minister of petrol, via a shell company he owned. The money was allegedly used to bribe several officials, including then-president Goodluck Jonathan, according to the Italian prosecutors dealing with the case. The trial began in mid-May.

— ENI — RDSA

IPO

A NEW BIOTECH COMPANY ON THE SWISS STOCK EXCHANGE

Polyphor, a biotech company based in Allschwil in the canton of Basel-Country, floated on the Swiss stock exchange. Founded in 1996, the company raised 165 million Swiss francs. The share price has been set at 38 Swiss francs. Funds from the IPO will be invested in the continued development of Murepavadin, an antibiotic designed to treat certain multi-resistant bac-

teria that cause a particularly aggressive form of pneumonia. It is also conducting trials on a breast cancer drug called Balixafortide. The Swiss stock exchange has had a particularly lively start to the year, with IPOs from sensor manufacturer Sensirion and medical group Medartis (see p. 18). IPOs from logisticians Swissport and CEVA are expected later in 2018. — POLN

transport

LIGHTNING-FAST CHARGING FOR ELECTRIC VEHICLES



ABB

ABB has developed an electric vehicle charger that can charge up to a range of 200 kilometres in only eight minutes. Most of the devices currently on the market are seven times slower. Fast recharging is a crucial argument to promote the adoption of electric vehicles, considering that filling up a car with petrol only takes a few minutes. The Zurich group's charger will be launched in the United States as part of an initiative called Electrify America, which aims to install 2,000 charging stations in approximately 100 Walmart supermarkets by the end of 2019.

— ABBN



1 billion

The number of users on Chinese social network WeChat, operated by Tencent. Users can send messages, make purchases, hail a taxi, transfer money or book holidays. As a comparison, Facebook has 2.2 billion users.



“The cryptocurrencies that will make it will have a significant impact on the way that we invest, pay bills and save money”

Managing Director of the International Monetary Fund (IMF), **Christine Lagarde**, asked governments to keep an “open mind” about cryptocurrencies.

food

ORGANIC FOOD DELIVERED TO YOUR DOOR



BLUE APRON

The concept was perfect for millennials: a box of fresh organic food delivered once a week, with a set of corresponding recipes. Over 150 companies are in the industry, including US-based Blue Apron and Germany's HelloFresh, both going public last year. But they're struggling.

Supermarket chains such as Walmart and Albertsons have started their own box deliveries. Client retention is also tricky: a year after joining HelloFresh, 89% of its US subscribers stopped using the platform on a monthly basis. Blue Apron's also dropped 15% in 2017. — APRN — HFG — WMT

SCANS

cleantech

MEYER BURGER AT WAR WITH A CHINESE COMPETITOR



China now holds nearly 80% of the global solar panel market.

INGRAM PUBLISHING / NEWS.COM

Bern-based solar expert Meyer Burger filed a claim in China against Wuxi Shangji Automation for infringement of its intellectual property. The competitor is accused of having illegally copied and sold one of its silicon cutting technologies, used to produce photovoltaic cells. A court in

Nanjing rejected accusations from the Swiss firm in first instance. It will appeal to the superior court of the Jiangsu province. This affair has become crucially important for Meyer Burger, which makes 80% of its revenue – 473 million Swiss francs in 2017 – in China.

— MBTN



“Okay, I’ll say it: bitcoin is a scam”

Bill Harris, ex-CEO of PayPal and Intuit.



144 million

The number of people who use a mobile payment system in Africa. Globally, they were used by 277 million people. In Kenya alone, the leading country for payment systems, there are 35 million users. The most well-known platform, M-Pesa, was created in 2007 by Vodafone and Safaricom.

THE FLOP

The Chinese studio that wanted to challenge Hollywood

Qingdao Movie Metropolis was supposed to be the biggest film studio in the world. With 30 stages, including one underwater, an amusement park, convention centre, hotels and international schools, it aimed to provide a complete ecosystem dedicated to the film industry. When the project, which cost Chinese group Dalian Wanda \$7.9 billion, was launched in 2013, Nicole Kidman and

Leonardo DiCaprio were present at the opening. But the studio is struggling to take off. Only one international production has been filmed there: *Pacific Rim Uprising*. Qingdao is too far from the traditional film circuits, it lacks talent and is forced to submit to the draconian censure imposed by the government. Seriously in debt, Dalian Wanda recently had to sell the studio to its competitor Sunac China.



LES AMBASSADEURS

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LUZERN
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LUGANO
VIA NASSA 5
+41 91 923 51 56

ST. MORITZ
PALACE GALERIE
+41 81 833 51 77

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TRENDS



the figure
HERBERT DIESS

The man after “dieselgate”

Title
CEO of Volkswagen

Age
59

Nationality
Austrian

The new CEO of Volkswagen has dedicated his entire academic and professional career to cars. Trained as an auto engineer, Herbert Diess wrote a thesis on automated assembly processes. He then spent seven years at Bosch, from 1989 to 1996, before moving to BMW, where he was head of the group’s UK factories and motorcycle division and later joined the board of directors. It was only in 2015 that he became head of Volkswagen’s

brand development. Diess now runs the show as CEO, following the ousting of his predecessor Matthias Müller. He inherits a company that is significantly affected by the “dieselgate” scandal which cost it \$30 billion. The new CEO must carry out an internal reorganisation designed to simplify the company’s structure. The German group will also invest several billion in developing electric cars, one of Diess’s favourite subjects. — VOW3



innovation
QUAYSIDE

The urban neighbourhood of the future

Sidewalk Labs, a division of Alphabet (Google’s parent company), is developing the first entirely smart neighbourhood. The project aims to transform Quayside, a rundown, neglected riverfront neighbourhood in downtown Toronto, into a top urban area. Robots will deliver packages to homes and pick up garbage that will then be sent to dumping stations via underground tunnels. Electricity will be supplied entirely by renewable energies, sidewalks will be treated with a special paint that melts snow and numerous sensors will monitor bench usage in parks, the amount of water consumed by residents and noise levels in order

to optimise how public services work. Private cars will also be forbidden. Instead, residents will have access to a fleet of self-driving cars.

— GOOGL

Company
Alphabet

Launch
2020

Cost
\$50 million



Indonesia is looking to develop its textile industry.

BAY ISMAYO / AFP

the country
INDONESIA

Population
261 million

GDP per capita in 2017
\$12,400

Growth in 2017
5.2 %

Main economic industries
petrol, palm oil, rubber, automobile

An invisible giant

When we think of countries experiencing incredible economic growth, China and India immediately come to mind. Indonesia, less so. However, the more than 17,000 islands that make up this country are worth a second look. After defaulting on its debt in 1997 during the Asia crisis, the country’s economy, which is heavily based on raw materials exports (leather, nickel, petrol, palm oil, rubber, etc.) has recovered spectacularly, with average annual growth of more than 5%. But while the poverty rate has fallen by 50% since 2000, the percentage of the population in

vulnerable circumstances is still high (40%). In order to appease citizens, Jakarta began a power struggle against mining giants (Newmont, Freeport, Rio Tinto) which were accused of destroying the environment and pillaging the country’s resources. The government aimed to receive a more equal share of the profits. President Joko Widodo also seeks to promote the development of a manufacturing industry in textiles and food products. He hopes to take some market share from China, as foreign companies are starting to leave China due to wage increases.

Furthermore, Indonesia and China (the main client and supplier to Jakarta) signed an agreement in May 2018 to increase their cooperation. The only underlying issue is the rising ethnic and religious tensions in the country, which could bring opposition leader Prabowo Subianto, who is supported by ultra-conservative Muslims, to power at the next presidential elections in 2019.

INTERVIEW

THE ART OF MENDING BROKEN BONES

Medartis is an exceptional Swiss company that designs titanium implants used by surgeons around the world. We meet CEO Willi Miesch at the company's Basel headquarters.

BY LUDDOVIC CHAPPEX
PHOTOS: NICOLAS RIGHETTI

Without even knowing it, you may be living with a piece of titanium just under your skin made by Medartis. This typically Swiss company is a global leader in manufacturing implants used in surgical operations to fix fractured and broken bones. While the Basel-based group just went public in March (see also Analyst Opinions on p. 22), it has over 20 years of experience in the market, with particular expertise in hand, wrist and jaw implants. In fact, Medartis is a spin-off of Straumann, a company specialised in dental surgery. Its founder, majority shareholder and current chairman is none other than Thomas Straumann.

The Basel headquarters, located in a modern building not far from Basel Badischer Bahnhof, is home to all of the group's strategic activities, including approach, design, product testing and final production. For long-time CEO Willi Miesch, this concentration of departments is proof of Medartis' expertise. "We would never relocate," said the energetic CEO, who is in his fifties and has held this role for 20 years. We meet with Miesch. ▶

MEDARTIS BY THE NUMBERS

54

The value of Medartis shares in Swiss francs the day of its IPO on the 23 March. It is now worth 62 Swiss francs.

32%

Medartis' market share in Germany.

105

The number of patents the company holds.

1997

Date the company was founded.

494

Number of employees at the Basel headquarters and around the world.

Medartis' IPO in March was a success. But for a long time you were unsure of an IPO. What made you change your mind?

The three main shareholders of Medartis, including myself, always clearly refused to sell the company to a large firm. And that position hasn't changed. We want to maintain our independence. But, after carefully analysing the situation, we decided that an IPO now made sense, because we are expanding internationally. This decision allowed us to gain a larger panel of investors. We gained a supply of capital that we will use to invest, and as a result, we'll be able to grow faster than we would have without an IPO.

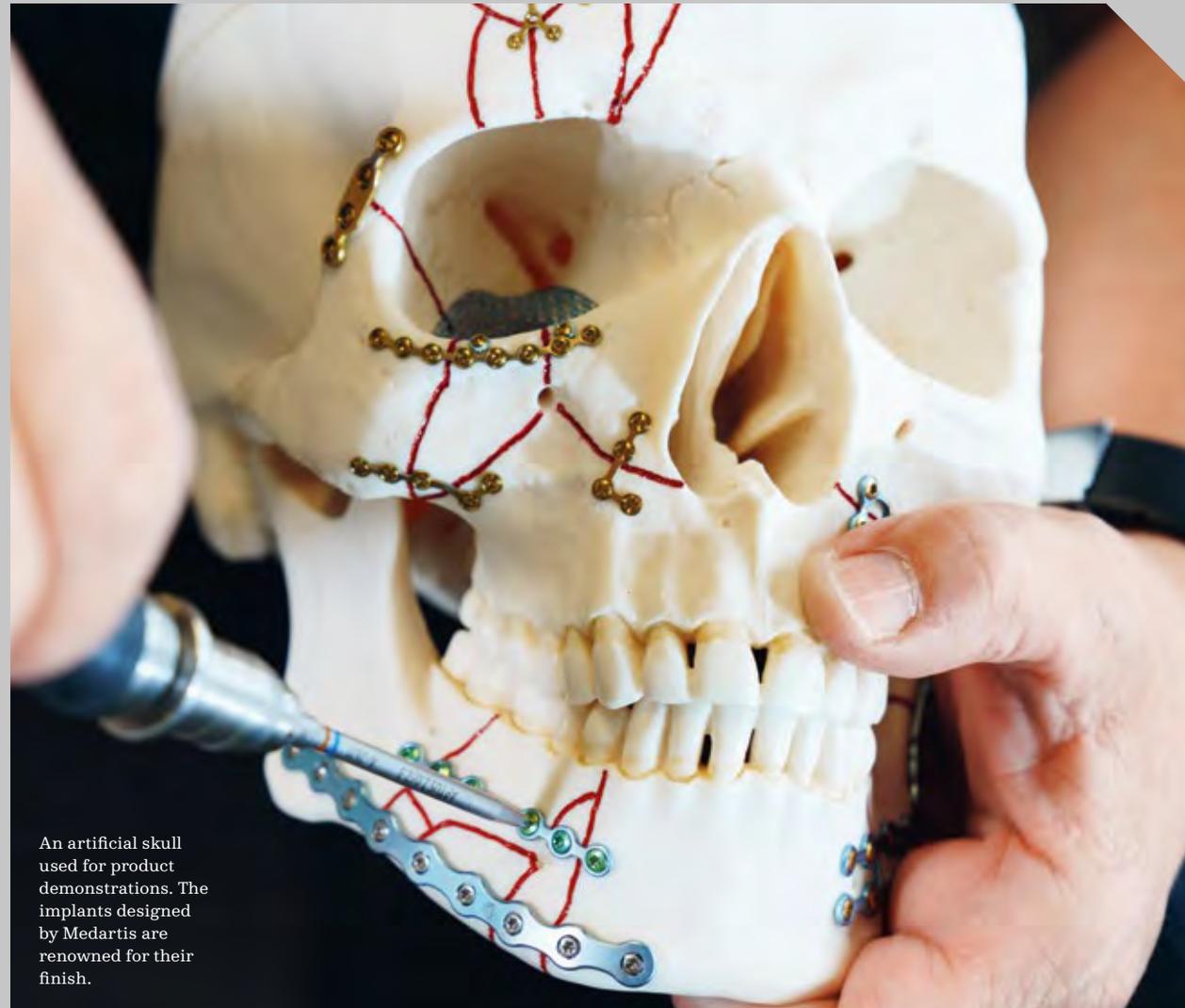
“Everyone is excited about 3D printing”

Which markets are you focusing on to grow the company?

Our main focus is still Europe, but we would like to progress further in the United States, where we already have a few years of experience. It's the largest market in the world and competition is obviously more present there than in Europe. Brazil is also a very promising market. We're planning to expand in Asia as well, particularly in Japan and China.

What sets you apart from your competitors, which are often much larger companies such as US-based Stryker or Depuy Synthes (owned by Johnson & Johnson)?

You could compare the added value of our products to the Swiss watchmaking industry. The expertise is similar to precision mechanics. When you hold a well-made watch, you can judge its quality simply by touching the band. Surgeons say the same thing about our implants. They clearly see the quality of our products when they operate. Moreover, several of our machine suppliers also provide equipment for the watchmaking industry.



An artificial skull used for product demonstrations. The implants designed by Medartis are renowned for their finish.



hospitals every week or so. Now we know the market well and we go less often. But our interactions with medical staff are still a very important part of our work. And since we visit operating rooms all over the world, we can share diverse experiences. Furthermore, we collaborate closely with the International Bone Research Association (IBRA), based in Zurich, during surgeon training programmes.

What are the most promising innovations in your industry?

Currently, everyone is very excited about 3D printing. It's the big thing right now. Last year, we acquired Mimedis, a Basel-based company that develops these types of solutions. We're using their software and cutting-edge technology to print some of our products. But it's impossible to launch new products and adopt brand-new procedures overnight in the medical industry. There's a very strict legal framework that we must follow that is designed to protect patients. It's similar to what the aeronautics industry has, for example.

What are the tangible benefits of 3D printing?

In some cases, we lower costs and gain time. If an operation requires us to make a very specific implant, for example to repair a fractured jaw, 3D printing is a very good solution. But quality control is an issue. If we only print one implant, it becomes more difficult to test it... Currently we're not planning to use 3D printing to make standard implants.

In your presentation brochure to shareholders, you said you wanted to improve the company's robotisation. In what way?

Essentially by optimising the last stage of production. Currently, machines can make all the parts, but they have to be collected, washed and checked manually. In the future, we hope that these steps can be handled by robots. ▶

A LEGITIMATE BOSS

CEO Willi Miesch didn't just come out of nowhere. Manufacturing medical implants isn't a mystery for Miesch, who began his career as an apprentice technician at the Institut Straumann. He quickly advanced through post-graduate degrees and other training and went on to successively hold various management positions before becoming CEO of Medartis in 1998, one year after the company was founded. Winner of the Ernst & Young Entrepreneur of the year 2016 award, Willi Miesch prefers straight talk and a very direct management style. A fan of motorbikes and mountain bikes, he was also a member of the management team for Swiss cycling brand Villiger for many years before it closed down. Miesch lives in the Lucerne region. He is a divorced father of two children aged 20 and 22.

The other aspect that sets us apart from the rest of the market is our responsiveness. We're able to make important decisions very quickly in only a few hours, whereas large companies are often slowed down by never-ending meetings. But clients don't like to wait.

Concretely, what are your interactions with the hospitals and surgeons that make up your clientele?

We spend a lot of time in operating rooms in order to understand exactly what surgeons need. Just a few years ago, I was visiting

The idea is to cut the percentage of manual tasks by half.

The implants you make are titanium. Is there significant progress on the horizon for the materials industry?

Titanium is still the best material we have today, including for 3D printing. It provides the best biocompatibility. The medical industry has been using it for the past 30 years.

What are your most promising product lines?

We strive to remain at the forefront of technology for hand and wrist implants. In other words, we're focusing on our strengths. But we're also growing in the elbow implant sector, and we just launched shoulder implants. We're also going to establish ourselves in the foot and ankle implant sector.

Do your products differ depending on the patients who use them?

There are no major differences, but

we're moving towards segmenting our products more precisely. Patient profiles have evolved, especially since older people are more active. A 75-year-old woman could injure her wrist while riding an electric bicycle, which was statistically less probable 20 years ago... We also know that the bone quality in this demographic is slightly different. That opens up the possibility of adapting products to a patient's age.

“I like to move fast, get clear responses”

Is the “Swiss made” label an effective sales pitch?

Absolutely. It's a significant advantage, both in a country such as the United States as well as in emerging markets. But because of the

label, clients demand high quality, excellent design and timeliness. The expectations are very high.

What are your teams like? How are various trades spread out among the company?

When the company first started, most of our employees had a technical or medical background. Then we grew and began hiring more employees for production and logistics. Now, our marketing and sales teams make up a large part of our workforce, and this trend will be even more visible in the coming years.

Your career path has been a model for bottom-up advancement. You completed your apprenticeship at the Institut Straumann, then worked your way up to become head of Medartis. How does this on-the-ground experience inform your day-to-day work?

I started my career manufacturing medical implants, so I know the practical aspects of this industrial sector.



The employees of the Basel site are now shareholders of the company.

ANALYST OPINIONS

“SHARES ARE ALREADY WELL-VALUED”

Diversified, high-quality products, good margins, an honest company that puts clients first... Analysts are very complimentary when discussing the fundamentals of Medartis. Pierre Kiecolt-Wahl, managing partner at Bryan, Garnier & Co even dubs it “the best of Swiss expertise” all at an “internationally-competitive price”. The market seems to agree: the company's share price increased 60% in the days following its IPO on March 23.

Founded in 1997 by entrepreneur Thomas Straumann – at the time head of the eponymous company that manufactures devices for dental surgery – Medartis was backed from the very start by its parent company, which injected approximately 100 million Swiss francs in total for Medartis' development. Since then, the company has become

an industry leader and this rise to power has sparked interest in international expansion. But will the Basel-based company make it? And if so, when? “I'm not concerned by the company's long-term future, five years from now and beyond. But in the shorter term, I have a few doubts,” said an analyst who follows the company. “The biggest challenge is expanding to the United States, a very competitive market, where surgeons are set in their ways... It will be difficult to get doctors out of their comfort zones and convince them to use new instruments and implants in their operating rooms, especially the older doctors.” CEO Willi Miesch himself is aware of this: his teams' ability to promote the quality of Medartis products in the US will be a determining factor. Analysts are impatiently awaiting the first figures, which will be published on 22 August.

Sybille Bischofberger, analyst at Zurich Cantonal Bank, shares the same prudent opinion: “The company's fundamentals are solid, but we're not expecting it to outperform the SPI over the next 18 months. Furthermore, shares are already valued rather high (ed. note: 62 Swiss francs as of 8 June). Currently, our price target is 64 Swiss francs.”

In short, lots of advantages but also a fair number of challenges. Competition will be fierce against heavyweights such as Depuy Synthes, Stryker and others. But the small Swiss company can look ahead, given its stable business model and the longevity of its industry, which isn't very affected by crises. There is also a substantial growth vector with a population that is ageing but increasingly active.

This experience is a big help when I'm talking with surgeons or our technicians. It also allows me to make decisions quickly. I like to move fast, get clear responses and encourage people to voice their opinion. But things change. It's easier to manage a team of 200 or 300 people than a bigger structure. We're becoming an international company and we have more rules to follow since the IPO.

On that note, what are the consequences of the IPO that you see in your day-to-day work?

I'll be more ready to answer that question in a year or two. But I would probably say that my job will

become more complex than it has been up until now. In practice, we have more administrative work and rules to follow. And I now receive warnings about what I am supposed to say and not say to journalists (laughs). But the main aspects of my job are the same. I still interact with our clients, engineers and salespeople. One of the positive results of the IPO, which is very important in my opinion, is that two-thirds of our Basel employees are now shareholders. That makes me very happy and proud.

Are you planning to acquire other companies

any time soon?

This is a perfect example of a question that I'm not supposed to answer... In any case, for the moment we don't have any concrete plans to do so.

What are some best practices from your competition that you could learn from?

Developing a more complete product line and establishing a strong, well-trained sales force that is better able to break into the US market. Hospitals in the US that are potential clients tend to purchase complete packages. We're aiming to improve in this area. ◀

ANALYSIS

THE VIEWPOINT OF SPECIALISTS

FOCUS

The surprising decline of the US stock exchange

The United States is experiencing a drastic decrease in the number of companies listed in around 20 years. This unprecedented phenomenon is poorly understood and there are no easy fixes.

BY MARTIN LONGET

Nowhere is as mythical as Wall Street in the somewhat intangible discipline of finance. Since its creation in 1792, the New York Stock Exchange has been the stuff of dreams for generations of investors – a symbol of easy access to capital. Some of the most sensational IPOs were Alibaba in 2014, Facebook in 2012 and Visa in 2008, which successfully raised \$17.9 billion in the middle of a recession.

But these highly publicised events hide another reality: the number of listed companies in the United States has fallen by half in the past 20 years. There were 7,322 in 1996 but only 3,671 in 2016. “To my knowledge such a decline is unprecedented. It’s exceptional,” said Andrew Karolyi, professor of finance and associate dean at the Samuel Curtis Johnson Graduate School of Management (Ithaca, New York). “It’s even more unusual due to the fact that it is only happening

in the US and actually goes against what we’re seeing in other developed countries, where the number of listed companies is tending to increase.” Over the same period, the number of equities on the Swiss exchange (SIX) rose from 534 to 2,359.

Nowadays, success seems to be reserved for a limited circle of investors

The decline of the US stock market is the result of two distinct occurrences: a sharp decrease in IPOs and an increase in delistings, or companies that leave the public market. One example is the voluntary delisting of IT giant Dell in 2013, bought back by founder Michael Dell and investment fund Silver Lake Partners

for nearly \$25 billion. Another is ketchup manufacturer H.J. Heinz, also purchased in 2013 by Warren Buffet’s fund Berkshire Hathaway and 3G Capital.

Analysts often try to blame this phenomenon on stricter financial regulations. It is true that the legal and financial requirements for publicly listed companies have drastically increased in the United States since the end of the 1990s, especially since the implementation of the Sarbanes-Oxley Act in 2002. This is often criticized in the United States and seen as a hindrance to market activity.

But Karolyi – co-author of “The U.S. Listing Gap”, the first major academic study on the subject, published in 2015 – is not convinced: “The movement we’re seeing today started in 1997, well before this new legislation. Moreover, it’s not a given that it hinders investments: some

ISTOCK



The New York Stock Exchange building on Wall Street in Manhattan (New York, USA).

buyout funds now stands at more than \$800 billion.

As capital once again becomes private, companies are no longer bound by restrictive legislation and can do as they wish. As a result, several companies that would have previously been candidates for an IPO either never go public or postpone it for longer, since targeting private investors is more attractive than public capital. In doing so, they further increase the gap on the US stock exchange, as IPOs (or lack thereof) can no longer make up for the increasing amount of delistings.

This phenomenon has adverse consequences for “small” investors: as they can no longer only rely on listed companies, the most attractive investments are increasingly out of reach, because they are reserved for a limited number of big venture capitalists. This trend is particularly strong in the US tech sector. In 1997, lucky investors who purchased Amazon shares during its IPO were able to make more than 1,000 times their original investment – the valuation of the company went from \$625 million to \$775 billion today. Conversely, in 2012, the first public buyers of Facebook only made 4.5 times their original investment if they still have their shares today. What’s the difference between the two companies? There were only three years between the creation of Amazon and its IPO, compared to eight years for Facebook.

Since the social network was older than Amazon at the time of its IPO, most of its profits were made before the IPO. Nowadays, success seems to be reserved for a limited circle of investors that have access to private investment funds and transactions before an IPO. Consequently, private investors are tending to disappear in favour of institutions and now hold just 20% of shares on the NYSE, compared to 50% twenty years ago. ◀

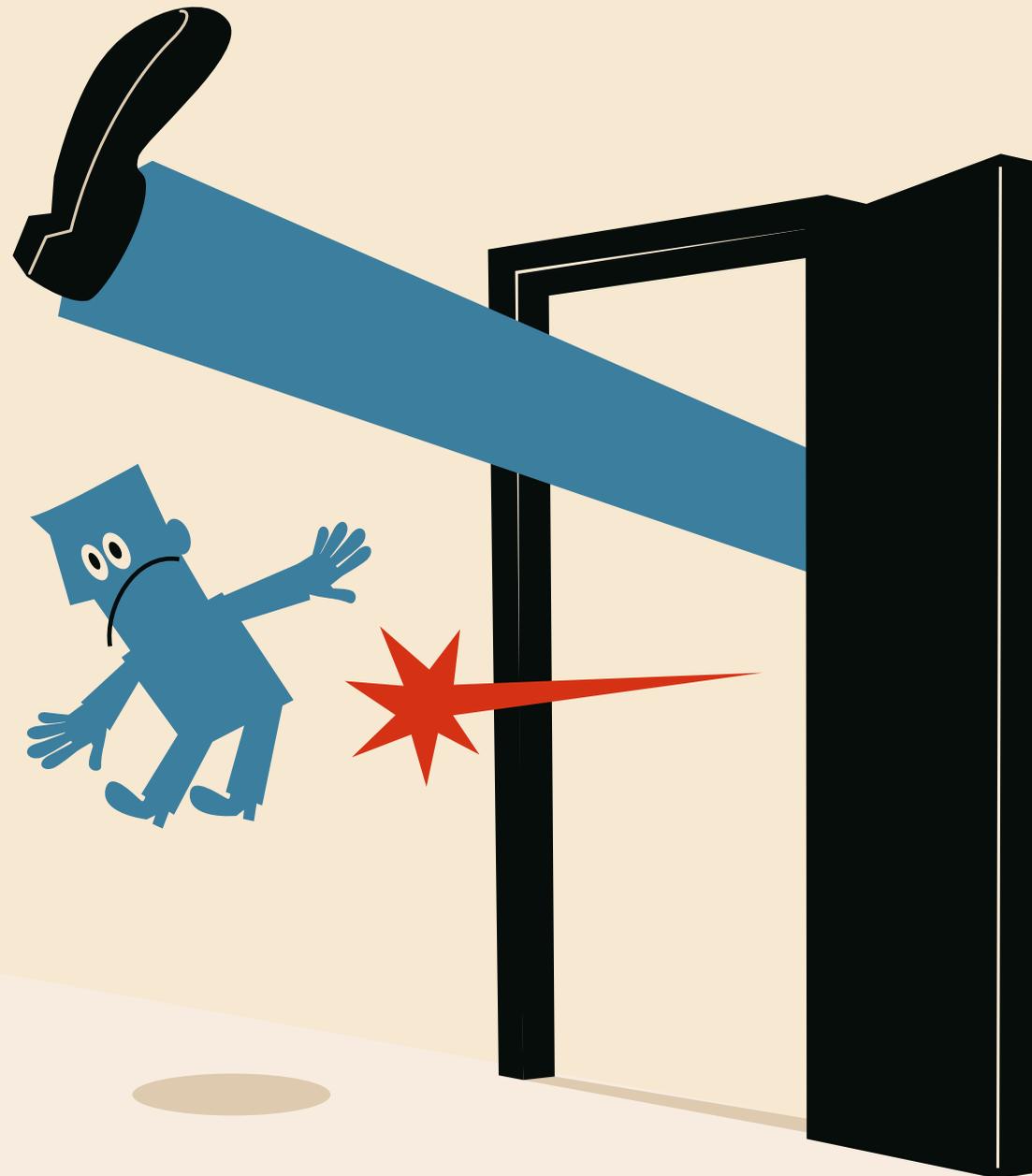
studies have shown the opposite – that strictly applied rules actually reassure investors and therefore are beneficial to the stock exchange and listed companies in the long run.”

The decline in listed companies has nevertheless pushed the US regulator to act, in particular through incentives for IPOs and fewer financial reporting requirements for companies with a turnover of less than \$1 billion. But these efforts have done little to reverse the trend.

POWER SHIFT

Karolyi believes that the problem must be considered from a different perspective: “In reality, what this

phenomenon shows is that it’s not so much the weakness of the stock exchange, but rather the extreme vitality of private capital and private investment funds in the United States that have almost unlimited means. It’s an unprecedented power shift that completely upends the traditional paradigm. It makes the number of listed companies a significant element of economic health.” This unprecedented shift has also been seen by Credit Suisse. In a study published last year, the Swiss bank determined that the number of private investment companies in the United States has risen from 24 in 1980 to nearly 3,000 today. Consequently the amount of



FINANCE ACTIVISTS

A handful of investors are disrupting large companies by demanding more profits. And to make themselves heard, these activists aren't afraid to push leaders to the door.

BY JULIE ZAUGG

Procter & Gamble, General Electric and Nestlé have all recently come under attack from activist investors. This phenomenon, which started in the United States in the 1980s, is growing fast. In the first quarter of this year, \$25 billion was spent on 73 activist campaigns, according to consulting firm Lazard – a record amount. Activists are also targeting larger and larger firms, increasingly often located in Europe and Asia.

But what do they want, these big-toothed wolves of Wall Street? “Their goal is to purchase shares in companies with poor management, get the company back on track, and then sell their shares at a profit,” explains Alon Brav, finance professor at Duke University.

There are a handful of superstar activist investors, such as Paul Singer of Elliott Management, Bill Ackman of Pershing Square, Nelson Peltz of Trian Fund and Carl Icahn of Icahn Enterprises.

And these iconic investors have inspired other activists. “Over the past three to five years, we’ve seen a new generation of activists that have made a name for themselves at big hedge funds before launching their own firms,” reports Rich Thomas, managing director of the shareholder advisory group at Lazard. Sachem

Head, Corvex Management and Sarissa are just three of these new activist funds.

Some have also emerged in Europe, such as Cevian Capital, a Swedish fund with an office in Zurich, and Shareholder Value Management, a German-based fund currently battling with Telecom Italia.

Bill Ackman has a reputation for calling every eight minutes when he is trying to intimidate a member of the board

To achieve their goals, these financial cowboys have a number of weapons in their arsenal. “First, they will try to convince the company to change its strategy, for example by preparing a presentation for the board of directors,” says Brav. But it’s not always quite so subtle – Bill Ackman has a reputation for calling every eight minutes when he is trying to intimidate a member of the board.

If these attempts don’t work, the alternative is to recruit other

shareholders. “The power of activist investors doesn’t lie in the 5% stake they have in the company, but in their ability to convince the other 95% of shareholders to get on board and vote for their ideas,” explains Thomas. To increase the pressure, some firms will launch an ad campaign in the media and on social networks, create websites and seek to influence analysts that cover the company.

In addition to the professionals, there is also a vast cohort of amateur investors that include many disappointed shareholders. “There are investors who form coalitions to force companies to listen to their complaints,” says Eleazer Klein, lawyer at Schulte Roth & Zabel, who specialises in this type of case.

The nuclear option, however, is placing one or several people on the board of directors in order to influence the company from the inside. In 2016, Starboard Value was able to replace four of the nine board members at Yahoo, even though the firm held only 0.75% of Yahoo’s shares.

Some of the most common demands issued to companies include “selling off certain underperforming divisions, cost reduction measures and manoeuvres to improve shareholder returns, such as buying back shares”, reports Josh Black, head of *Activist Insight* magazine. >

In 2013, Trian Fund tried to convince Pepsico to create two separate entities for drinks and snacks in order to boost sales for the latter, more profitable entity. More recently, Sachem Head wanted to convince UK-based Whitbread to divest itself of Costa Coffee, which was struggling.

Sometimes, activists try to halt mergers or acquisitions that are seen as unwise, or even push the firm to go up for sale. In early 2018, Carl Icahn tried to block Fuji's acquisition of Xerox. For its part, Sachem Head tried to convince pharmaceutical

group Shire to put itself up for sale. Activist investors succeed in more than two-thirds of cases, according to a McKinsey study. Often, the targeted company reaps the benefits. Darden Restaurants, which owns Olive Garden, saw its share price increase by nearly 60% between 2014 and 2016 following an intervention from hedge fund Starboard Value. The fund demanded that the amount of bread given to customers be reduced, that salt be added to pasta water, and that alcohol be better promoted to customers.

However, activist investors are often

accused of focusing on short-term profits to the detriment of a company's long-term growth. "The battle itself could have negative effects on the company, because it disrupts normal business proceedings and monopolises the executive management's attention," says Thomas.

Some even call it "green blackmail", a term inspired by the colour of US currency. This is especially true if an activist demands changes from a company in order to make a profit in exchange for promising to stay out of the company's business. ▽

THREE CASE STUDIES OF SUCCESSFUL ACTIVISM

Whether in the form of letters to shareholders, leaking rows to the press or taking control of a board of directors, activists have many ways to make their targets fold under pressure.

A BATTLE FOR INFLUENCE AT PROCTER & GAMBLE'S BOARD OF DIRECTORS

Nelson Peltz of Trian Fund Management tried to join Procter & Gamble's board of directors, whose "stifling bureaucracy" and "insular culture" he had been criticising since summer 2017. The tussle led to an immense public relations battle. "Procter & Gamble spent \$100 million to try to block Nelson Peltz," says Eleazar Klein, a lawyer specialising in these types of cases. But the company was ultimately unsuccessful – the 75-year old became a member of the board of directors in March this year.

WHEN THIRD POINT PILED THE PRESSURE ON NESTLÉ

In June 2017, activist investor Third Point revealed it had taken a 1.3% share in Nestlé and sent a letter to shareholders to denounce the company's sluggish revenue growth and insufficient margins. It also demanded that the food giant sell its shares in L'Oréal and encouraged the company to take on more debt. A few months later, the Vevey-based group announced a series of changes intended to satisfy Third Point, including a margin target between 17.5% and 18.5% by 2020 – compared to around 15% currently – and a buyback programme. The Swiss firm also promised to look at reselling its struggling US candy division.

THE CLARIANT-HUNTSMAN MERGER STOPPED IN ITS TRACKS

In spring 2017, Basel-based Clariant announced its intention to merge with Huntsman, based in the US. But activist investors Corvex Management and 40 North were having none of it. The merger threatened to expose Clariant to Huntsman's debt, as well as to the volatility of the chemical raw materials market in which Huntsman operates. The investors increased their shares in the Swiss company, eventually reaching a 25% holding and blocking the transaction. In autumn 2017, Clariant admitted defeat and decided against the merger.



HAPPY SPORT
Chopard

LIFTS: MOVING EVER UPWARDS

The lift industry is booming. Galvanised by a decade of growth in China, the industry is preparing to introduce several major innovations.

BY JULIE ZAUGG

Each day, one-seventh of the global population gets in one of the 14 million lifts around the globe. It is the most used form of transport in the world. Without lifts, Manhattan would have stayed a small town, Dubai would be a Bedouin village and megacities like Shanghai and Sao Paulo would be filled with infinite suburbs. Invented during the second industrial revolution at the end of the 19th century, the modern lift made it possible for cities to grow upwards.

“The first lifts, installed in mines, were steam-operated and were made up of a simple basket attached to a rope,” says Andreas Bernard, a researcher at Leuphana University of Lüneburg in Germany, who has

written a book on the subject. “There were so many accidents.” In 1854, Elisha Otis – who gave his name to the eponymous company – invented a lift with a brake, which would engage if the cord broke. The device was installed in a porcelain shop in New York, but customers were so scared to use it that it was taken down a few years later.

Two innovations made it possible for lifts to really take off: the use of steel in construction, allowing for buildings with more than 12 storeys for the first time, and the invention of an electrically-powered lift. New York, crowded on the island of Manhattan, was the first city to soar towards the clouds, followed a few years later by European cities.

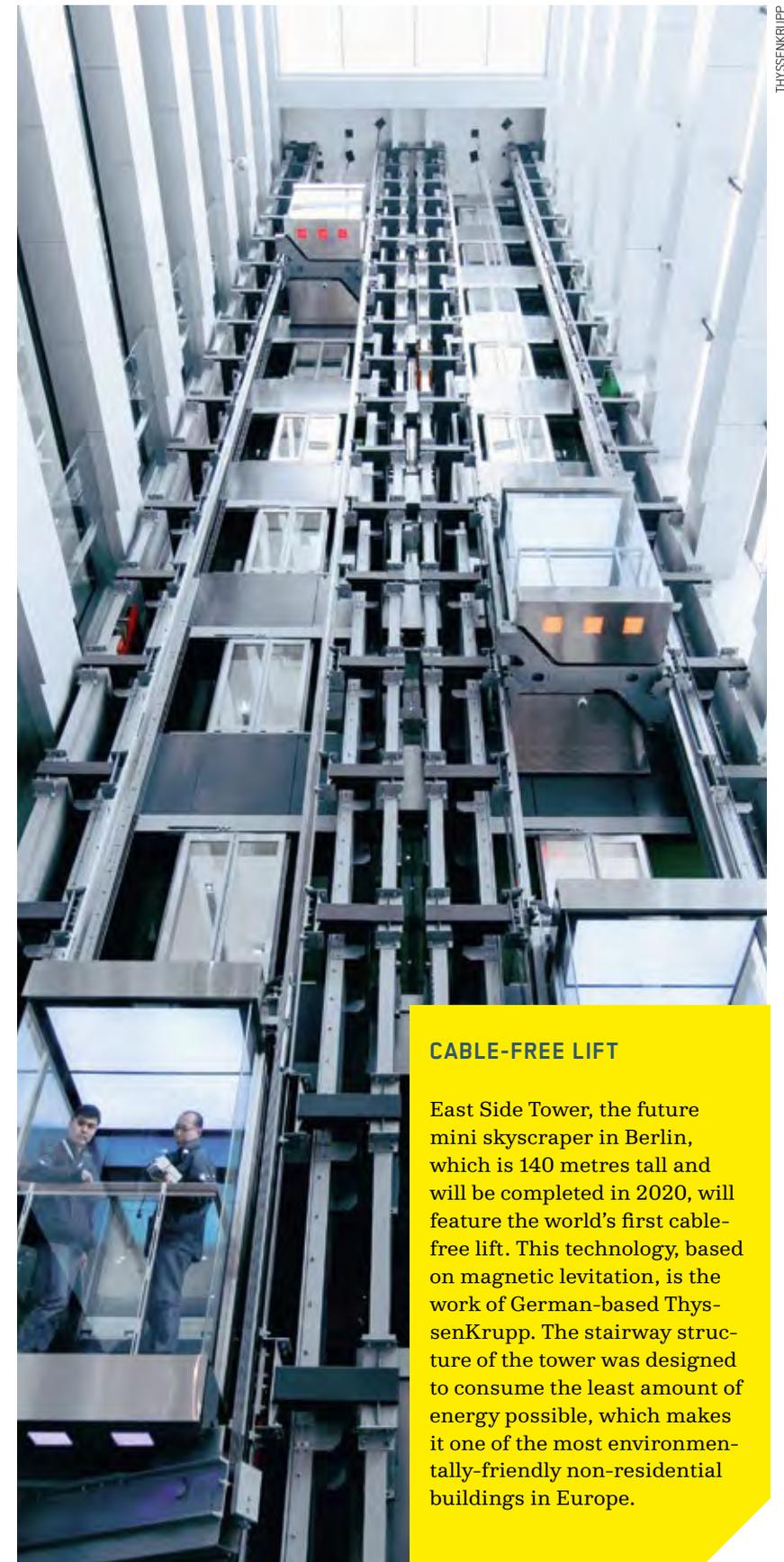
More recently, growth in the industry, which is worth €70 billion yearly, has come from the east. “The spectacular development of Chinese cities led to a boom in new lift installations,” says Marc Gabriel, an analyst at Bankhaus Lampe. The country is home to half of the world’s skyscrapers higher than 300 metres and two-thirds of buildings higher than 200 metres. Of the 770,000 new lifts installed in 2016, 65% of them were in China. Over the past two years, the Chinese market has slowed slightly, but India could soon take up the torch. “The potential there is huge,” says Félix Brunotte, an analyst at AlphaValue.

Four enterprises share this attractive market: the US’ Otis, Switzerland’s Schindler, Germany’s ThyssenKrupp and Finland’s Kone

Four companies share this attractive market: the US’ Otis, Switzerland’s Schindler, Germany’s ThyssenKrupp and Finland’s Kone. “Together, they represent close to 60% of revenue in the industry,” says Brunotte, who doesn’t shy away from using the term “oligopoly”. In 2007, the European Union fined them nearly €1 billion for creating cartels to inflate their products’ prices.

MAGNETIC LEVITATION

Despite this concentration, the industry isn’t resting on its laurels. In recent years, it has produced a number of major innovations. The most spectacular is “Multi”, developed by ThyssenKrupp. “It’s the first cable-free lift,” says Gabriel. “It moves using electromagnetic energy.” The German group was inspired by the ▶



THYSSENKRUPP

CABLE-FREE LIFT

East Side Tower, the future mini skyscraper in Berlin, which is 140 metres tall and will be completed in 2020, will feature the world’s first cable-free lift. This technology, based on magnetic levitation, is the work of German-based ThyssenKrupp. The stairway structure of the tower was designed to consume the least amount of energy possible, which makes it one of the most environmentally-friendly non-residential buildings in Europe.



THE LONGEST TRIP IN THE WORLD

Once completed in 2020, the Jeddah Tower will resemble a long glass arrow pointed towards the sky in the middle of the desert. It will be the tallest building in the world at 1 km high. The tower will have a lift capable of reaching 660 metres in one trip. This major technical achievement will be made possible by an ultra-light carbon fibre cable called UltraRope. It is being developed by Finnish group Kone.

magnetic levitation trains that it helped develop.

This innovation makes it possible to build a lift shaft with no height limitations. “The cable is responsible for up to 70% of the weight of a lift,” adds Brunotte. “This means that, until now, building a lift that could go 700 or 800 metres up in a single trip was simply impossible.”

“It’s also possible that several lift cars could move simultaneously in the same shaft, which could save precious square metres of space, especially at the top of skyscrapers which are usually quite narrow,” adds Adrian Godwin. Godwin, a consultant specialising in lifts, predicts the emergence of vertical cities. “Why not install a shopping centre or a hospital on the 50th floor of a skyscraper?” he asks.

Even more astounding is the fact that magnetic levitation would make horizontal lifts possible. “They could connect several buildings together or make it possible for buildings to be built in unusual shapes, like in a ring,” he adds.

Another major innovation is UltraRope, developed by Finland’s Kone. “The carbon fibre lift cable is ultra-light,” explains Pekka Spolander, an analyst at OP Financial Group. “It uses less electricity and can create longer lift shafts (ed. – like the Multi system from ThyssenKrupp). It boasts energy savings of 45% over an 800-metre trip. These cables are also two times stronger than steel cables and sway less.”

But there is still one aspect – speed – where innovative possibilities seem to have reached their limits: “It’s likely impossible to go beyond 20 metres per second (approximately 70 km/h) because it would be uncomfortable for passengers,” says Godwin. “The cabin would have to be pressurised, similar to an aeroplane.” The Toshiba lift that reaches the summit of the

Taipei 101 Tower in Taiwan uses such a system. However, it is costly and impractical.

FUTURE SMART LIFTS

The next revolution in the vertical transport industry will likely come from big data and artificial intelligence. “Users will communicate with the lift through an app,” explains Pekka Spolander of OP Financial Group. “They will indicate where they want to go and will be directed to the lift that will bring them to their destination as quickly as possible.” Semi-smart lifts already exist: they group together passengers going to the same floor, minimising stops and empty trips. The Shard, a London skyscraper, has one of these lifts.

Kone has partnered with IBM, Schindler with General Electric and ThyssenKrupp with Microsoft

Digitalisation of the sector is also set to transform the maintenance industry. “New lifts will be connected to the cloud via sensors,” reports Bernd Pomrehn, an analyst at Swiss-based bank Vontobel. “This allows operators to detect and even anticipate the slightest technical failure.” To implement this preventative maintenance, Kone has partnered with IBM, Schindler with General Electric and ThyssenKrupp with Microsoft.

This is because lift manufacturers know that maintenance is the goose that lays the golden eggs. “Margins are up to 25% in this field, compared to 10% for installing a new lift,” says AlphaValue analyst, Félix Brunotte. “Additionally, maintenance contracts span several decades, which generates stable revenue.” The life cycle of a lift is between 20 and 25 years. ▲



20 M/SEC, A RECORD TO BEAT

Most lifts move at a rate of 8 or 9 metres per second. However, the Japanese group Mitsubishi has been able to significantly increase this speed. In the Shanghai Tower – opened in 2015 and standing at 632 metres high – the lift reaches 20.5 metres per second (almost 74 km/h). In Guangzhou, the CTF tower, which opened in 2016, also has a fast-paced lift. The Hitachi-built lift reaches the 95th floor in 45 seconds, for an average speed of 20 metres per second.

COMPANIES TO WATCH

THYSSENKRUPP

The innovation champion

The German firm, which also has a large steel division, stands out for its focus on innovation. But it has profitability issues. "Its margins aren't as good as its competitors," notes Marc Gabriel, an analyst at Bankhaus Lampe. They stand at around 10%, compared to 12%-14% for its peers. ThyssenKrupp is also late to the game in the Chinese market. "The group opened its first factory there only about 10 years ago," adds Gabriel, who nevertheless recommends purchasing shares.

HEADQUARTERS
DUISBURG AND
ESSEN (DE)

EMPLOYEES
158,739

2017 REVENUE
€ 41.5 BILLION

CAPITALISATION
TKA

SCHINDLER

A truly global player

Founded in 1874, the company "has a truly global clientele", says Bernd Pomrehn, an analyst at Vontobel bank. Unlike some of its competitors who bet everything on China, Schindler has a strong presence in Europe and the Americas, which make up 40% and 29% of its revenue respectively. The company has also invested in new factories that will allow it to standardise its lifts and make economies of scale. But it made a strategic error when it entered the Chinese market. "Schindler came in with two premium products, which didn't correspond to local demand," says Pomrehn. China particularly needs low-cost lifts designed for residential buildings. Most analysts recommend keeping shares.

HEADQUARTERS
EBIKON (CH)

EMPLOYEES
61,019

2017 REVENUE
CHF 10.2 BILLION

CAPITALISATION
SCHN

OTIS

The sleeping giant

The US firm founded in 1853 is now part of the United Technologies conglomerate. While it is still the leading company in the lifts market, "it hasn't invested enough in R&D", according to Félix Brunotte, an analyst at AlphaValue. Its main strength is its very dense maintenance network. "The more clients a company has in the same city, the more it maximises profits," says Brunotte. Its Spanish subsidiary Zardoya Otis also dominates the Iberian market, with a 25% market share. However, the market is very dynamic. Most analysts are nonetheless cautious and some recommend selling shares.

HEADQUARTERS
FARMINGTON (US)

EMPLOYEES
66,000

2017 REVENUE
\$12.3 BILLION

CAPITALISATION
UTX

KONE

Beloved in China

The Finnish group arrived very early in China, in the early 2000s, and now dominates this market that has seen explosive growth. But that is also the group's main weakness. "Beginning in 2016, its volume started to decline in China, by around 5% to 10%, due to the economic slowdown," said Pekka Spolander, an analyst at OP Financial Group. This problem was made worse by the group's strong reliance on the installation of new lifts, rather than the more profitable maintenance. This sector makes up only 32% of its revenue, compared to 40% for its competitors. Analysts have varied opinions. Most of them recommend retaining shares.

HEADQUARTERS
HELSINKI (FI)

EMPLOYEES
55,000+

2017 REVENUE
€ 8.9 BILLION

CAPITALISATION
KNEBV



HOW LONG IS FOREVER?

HYT
#HYTWATCHES

DOSSIER

INSIDE A TRADER'S MIND

Spectacular progress in neuroscience has made it possible to understand the brain mechanisms that influence our financial decisions. A deeper understanding of the brain and its cognitive biases could lead to better investments.

BY BERTRAND BEAUTÉ

- 38. Trading places: a day in the life of a trader
- 45. Decision-making decoded
- 46. Infographic: a link between an appetite for risk and grey matter
- 48. Interview with Paul Glimcher, the American neuroeconomist
- 50. Seven illustrious traders and investors
- 58. The death of *Homo Economicus*
- 60. Will robots replace traders?

Being a trader is one of the most exciting jobs out there. Its appeal is far-reaching, judging by the success of films that portray the profession. From the 1987 cult classic *Wall Street* by Oliver Stone to Martin Scorsese's hit *Wolf of Wall Street* released in 2013, numerous feature films have delved into the inner workings of markets and those who deal in them. But Hollywood is no longer the only one trying to get into investors' minds. The recent science of neuroeconomics is picking up where screenwriters left off, but without all the excesses of the big screen.

"Neuroeconomics is a branch of research that combines neuroscience and economics," says Alexandre Pouget, professor at the Department of Fundamental Neuroscience of the University of Geneva's Faculty of Medicine and member of the International Brain Lab (IBL). "The field is taking off, mainly due to the progress in neuroimaging. We're beginning to truly understand how humans make decisions, for example when it comes to making financial choices." ▶

Dossier by:
Bertrand Beauté,
Ludovic Chappex
and Martin Longet.

Neuroeconomics began to emerge as a scientific discipline in the late 1980s. But the field really started to make progress with the development of functional MRI (fMRI) in the mid-1990s. “This medical imaging technique measures brain activity as it’s happening,” says Sacha Bourgeois-Gironde, professor of economics at University Paris 2 Panthéon-Assas and a specialist in neuroeconomics. “At first fMRI was only used by doctors, and they didn’t quite understand why economists such as myself wanted to use their machine. They would ask, ‘but how is that going to help my patients?’”

Why do we buy a given share? How does the brain work in making that decision? Is it a good idea? Rational? Emotion-based?

Save patients, maybe not. But neuroeconomics might help investors by answering lots of questions. Why do we buy a given share? How does the brain work in making that decision? Is it a good idea? Rational? Emotion-based? “Better understanding the reasons behind our choices is crucial for investors,” says economist Mickaël Mangot, who teaches at ESSEC and AgroParis-Tech, and is author of the book *Psychologie de l’investisseur et des marchés financiers*. “It helps people understand their own behaviour and correct any bias, but it also helps them decipher the behaviour of others. And that means anticipating market movements, especially financial bubbles.”

So, how does our brain work? And why do some investors, the likes of Warren Buffet, amass heaps of cash, while others sink ever deeper into losses, or even break the law after making too many risky choices, such as Jérôme Kerviel (see features p. 54)? To understand the successes and failures of market dealers, *Swissquote Magazine* takes a look into the brain of a trader.

TRADING PLACES: A DAY IN THE LIFE OF BOB BULLISH

A journey deep into the world of neurons, where hormones flow incessantly – the story of a trader.



7:00 A.M., THURSDAY

Hi. I’m Bob Bullish, and I’m a trader. Why that smile? Yeah, I know. The job has a bad reputation. Jérôme Kerviel, Jordan Belfort, Nick Leeson. They’re all traders. They’ve got everyone confused about what we do. But let me reassure you, 99.9% of traders are honest, hard-working people. I’m a good guy. And my job isn’t easy.

And this morning, I feel great. That’s because of my day yesterday. My performance surpassed all expectations

I spend up to 11 hours nonstop in front of a screen, under constant stress. Some scientists say that high-tension lifestyle explains why most traders are young men. They can’t handle the stress beyond age 35.

But I’m not there yet. And this morning, I feel great. That’s because of my day yesterday. My performance surpassed all expectations – my own and my superiors’. I was congratulated left, right and centre. I was in heaven. But I shouldn’t always trust my memory. “Memory is not an exact process. It’s a reconstitution of reality,” says Arnaud D’Argembeau,

a researcher at the Centre for Cognitive Neuroscience at the University of Liège. When reconstituting memories, we tend to give ourselves the best role and only retain the positive.

We use our memory to predict what is going to happen, but most people have an optimism bias. In other words, they overestimate the likelihood that positive events will occur and underestimate the probability of negative outcomes,” D’Argembeau adds. Research published in the journal *Current Biology* says that 80% of traders exhibit this optimism bias. For me, as a trader, and for all investors, this tendency represents a risk – the risk of not anticipating a downturn on the markets.

But that’s not the issue at hand. The day has just begun, and I’m looking at what’s happening on markets worldwide, especially in New York, which closed at 10:00 p.m. last night, and in Tokyo, which closed at 7:00 a.m. this morning. The predictions I made yesterday were right. That boosts my confidence. A cup of coffee, and I’m off to the office. ▶

9:00 A.M., THE STOCK MARKET OPENS

We're not on Wall Street, but in Zurich. My office doesn't have all the craziness that you see in films like *Wolf of Wall Street*. But I can guarantee you that the stress and excitement are definitely there. Today, I can already tell something is going to happen. Just by looking at my colleagues, what's happening on the market, and my positions, I get the feeling that certain shares are about to soar. That's what we call

My prefrontal cortex is firing, and my intuition is everywhere at once

trader intuition. Don't believe in it? Well, you should! In the groundbreaking article "Exploring the Nature of Trader Intuition", scientists at the California Institute of Technology

(Caltech) succeeded in identifying a region of the brain involved in this process. It's in a part of the prefrontal cortex.

What I think is funny is that this area has long been known as the part of the brain responsible for "Theory of Mind". This region of the brain, which starts developing in children at age two, gives us the ability to understand that other people have intentions and mental states. In other words, it is a form of empathy that allows people to predict what others think or how they will act next. By extension, the area is also engaged when we imagine the behaviour of things that seem to have intentions, such as stock markets.

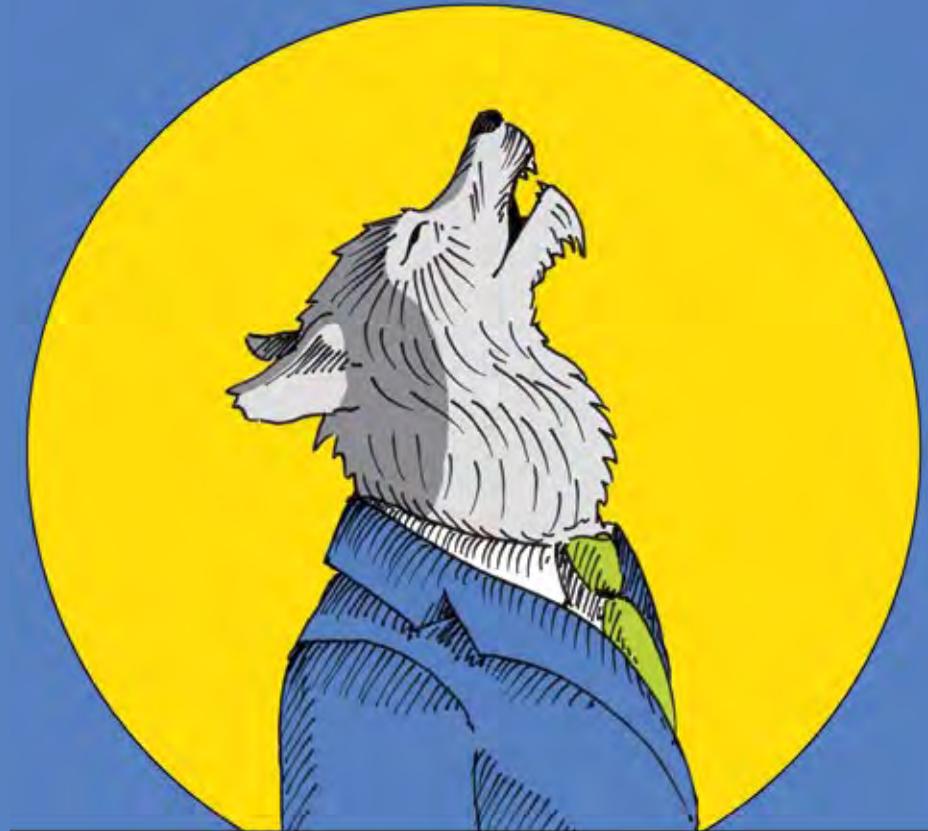
In their study published in the *Journal of Finance*, the Caltech research team showed that subjects with a more finely-tuned Theory of Mind had a greater propensity for predicting future share prices and, as a result, made better investments. Yes, you read that correctly. Essentially, the best traders are those with the most empathy. Surprised? Now let's get back to me. So, this morning, my prefrontal cortex is firing, and my intuition is everywhere at once.

I take my positions as soon as the SIX opens. Initial feedback is positive and confirms what I thought. Small amounts of dopamine, the pleasure hormone, are released in my brain. I feel good. Confident. At the same time, my testosterone level is beginning to rise. Without realising it, this steroid hormone associated with aggression is boosting my confidence and optimism.

As the morning proceeds, I rack up more profits. That's when I take my first risk. I put down a larger amount. Right as I click with my mouse, I can feel my heart pounding

faster. Nothing unusual about that. A study published in the *Journal of Cognitive Neuroscience* showed that all traders have a strong emotional response during live trading sessions and especially in periods of heightened volatility, along with a higher heart rate and increased sweating. Basically, I'm just like any other trader.

But I should calm down, because traders with the strongest emotional reactions are least successful in trading, as demonstrated in scientific research from the American Economic Association.



LUNCHTIME, WITH OPTIMISM IN FULL SWING

Lunch for me is a sandwich that I gulp down, my eyes glued to my screens. The stock market doesn't shut down for lunch. While eating, I vaguely glance at the news feed and my colleagues who are doing the same. The figures on display are large and green. Everything is fine. Everything is excellent, actually. I feel as though I can control what happens, that nothing bad can happen to me today.

What effect can the flow of male hormones have on my performance?

That must be the testosterone. In 2008, researchers measured testosterone levels in traders working in the City of London, for six days straight. Their findings, published in the *Proceedings of the National Academy of Sciences (PNAS)* of the

United States, showed that levels of the hormone increase when the markets rise. If the situation continues, traders experience "positive feedback loops", meaning that amounts of the hormone keep shooting up. For example, after six straight days of huge gains, one trader's testosterone jumped 74%.

"The popular view is that experienced traders can control their emotions. But, in fact," as an author of the study in *New Scientist* put it, "their endocrine systems are on fire". What effect can the flow of male hormones have on my performance? Researchers answered that question in a lab redesigned to resemble a trading floor, administering testosterone or a placebo to 142 participants. The findings, published in *Scientific Reports*, leave no shadow

ow of a doubt: testosterone induces too much optimism about future price changes.

And that phenomenon is aggravated by the positive-feedback loops I mentioned earlier. The more you make, the higher testosterone rises. That is similar to the winner effect experienced by athletes who store increasing amounts of testosterone. A successful trader is, in a way, intoxicated by his own testosterone. He becomes more self-confident, and his ability to make rational choices melts away. Then he starts making mistakes.

When Jérôme Kerviel had to explain why he fraudulently traded up to €50 billion, he told the judges that he was, in essence, blinded by success. Personally, I believe that could be true. Risk-taking and success act like a drug in the brain. It's a sort of addiction that means that successful traders are inclined to keep risking more. I hope that won't happen to me.



3:00 P.M., THE BUBBLE BURSTS

Wall Street is about to open, and orders start piling up. If a new trend emerges, it will heavily influence the securities of the Swiss stock exchange – so I have to watch things carefully. Euphoria still abounds on the trading floor. But a slight anxiety comes over me. A little voice inside my head says, “What if it’s all too good to be true?”

A little voice inside my head says, “What if it’s all too good to be true? Too good to last?”

I’m torn. On one side, the market keeps climbing, and all my colleagues seem to

think the surge will continue. But on the other, I sense that it’s all about to come tumbling down. After a quick coffee and a think, I decide to close my positions. What happened in my brain that caused me to sell while the market was bullish?

To find out, the California Institute of Technology watched traders’ brain activity as they invested in fictitious markets in which speculative bubbles – i.e. when the price of an asset exceeds its intrinsic value – developed. The findings, published in the *PNAS* in 2014, demonstrated that successful traders, i.e. those who sold before the bubble crashed, felt

and sometimes of your superiors. In those cases, I like to remember

Immediately after a period of high stress, traders tend to veer towards riskier investments to cover their losses

a quote from Warren Buffett, who tells investors to “be fearful when others are greedy, and greedy when others are fearful”.

“Seeing what’s going on in people’s brains

when they are trading suggests that Buffett was right on target,” says Colin Camerer, the main author of the study. “Emotionally, they have to do something really hard: sell into a rising market. We thought that something must be going on in their brains that gives them an early warning signal.”

But let’s get back to the office, where most of my colleagues have not yet received that warning signal. The *PNAS* study shows that insula activity remains low in most traders. However, activity in their nucleus accumbens (NAcc) is high as the bubble forms and after it bursts. This region of the brain, which plays a role in the reward process, drives them to keep buying, even after the peak.

uncomfortable before prices started to fall. That feeling manifested itself through increased activity in their insula, a region of the brain associated with fear, disgust and rejection.

In the midst of a market bubble, a red flag goes up in the brain of seasoned traders, like a warning signal that makes them feel uncomfortable and urges them to sell, sell, sell, the researchers say. In reality, when you’re confronted with that kind of situation, I admit it’s not an easy decision to make. You have to go against general opinion as well as the opinion of your colleagues

ket volatility. Cortisol is known for preparing the brain for danger. This system is designed to protect us in nature, but it can cause erratic and inappropriate behaviour on the trading floor.

In 2015, a research team proved this by administering either a placebo or hydrocortisone (the pharmaceutical form of cortisol) to traders. Published in *Scientific Reports*, their findings showed that surges of the hormone induced a short-term, uncontrolled rise in risk-taking. In other words, immediately after a period of high stress, traders tend to veer towards riskier investments to cover their losses.

I hope my colleagues don’t get caught up in this losing game. When it all goes down the tubes, you need to forget your intuitions and go back to the basics. If the downturn persists, their behaviour will totally change. Scientists from the University of Cambridge studied the effects of cortisol over an eight-day period. Their work showed that chronically high cortisol levels brought about a dramatic drop in the willingness to take risks. The authors of the study, published in *PNAS* in 2014, believe that this shift in risk preference is an “underappreciated” cause of market instability. Stress may indeed aggravate financial crises, by making traders averse to risk for overly lengthy periods, right at the time when risk taking is needed to jumpstart collapsing markets.

One hypothesis is that cortisol increases short-term risk-taking but inhibits risk-taking over the longer term. >

SOME TIME AFTER 9:00 P.M., A BEER AND A LOOK BACK AT THE DAY

Once the SIX is closed, we head for the pub. Time to let off steam with my colleagues even though, I have to admit, we're still checking our phones to track the US stock markets, which close at 10:00 p.m. In

Women produce about 10% the testosterone of men, and the hormone does not affect their judgement

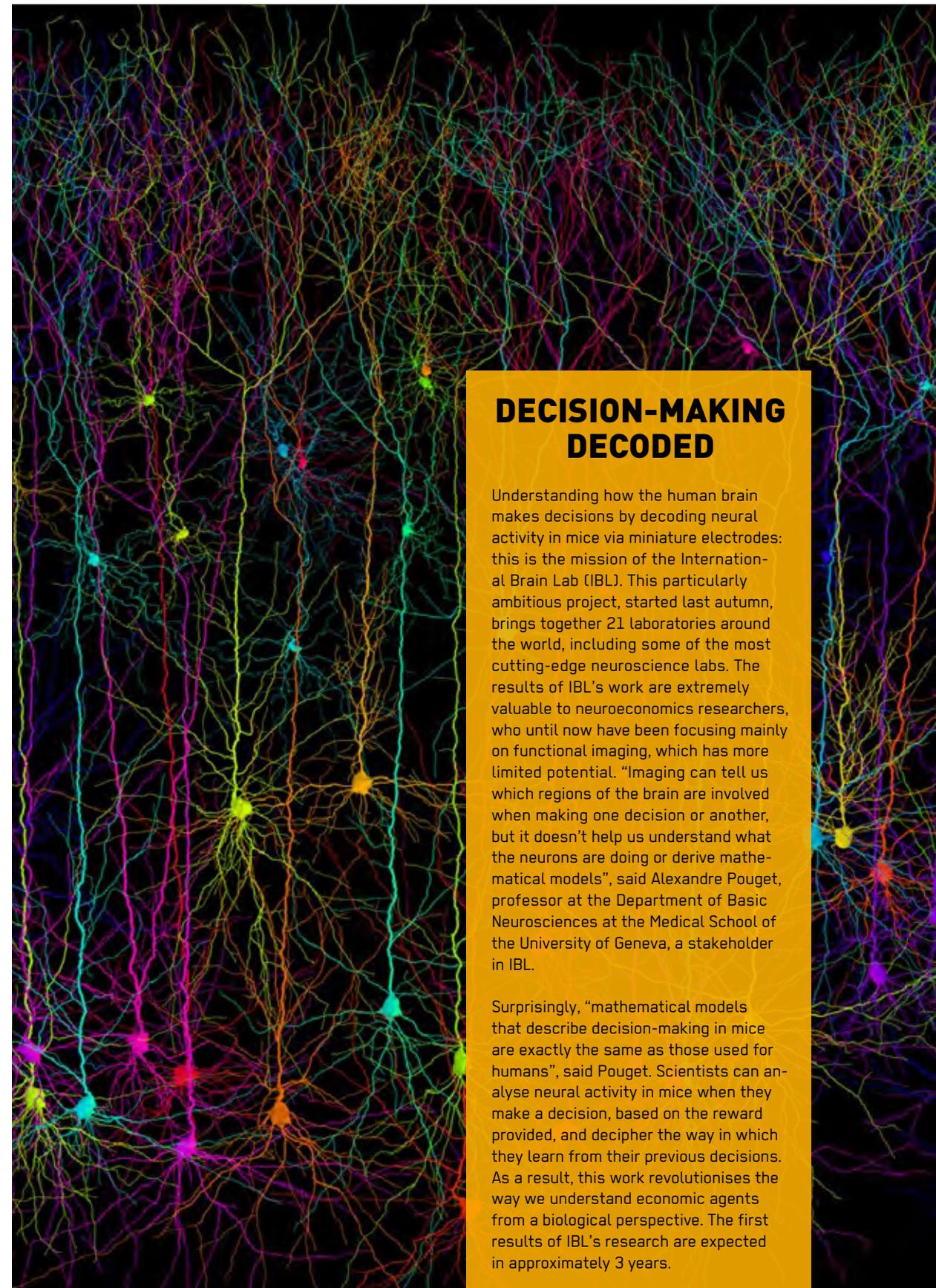
a little corner of my brain, I think about all those experiments in neuroeconomics. Of course, the findings should still be discussed. For example, experts do not agree on the role of cortisol. But one thing is

sure, our decisions are influenced by our brain and our physiology. "Better understanding what happens in the brains of traders and investors could improve the financial system," says Sacha Bourgeois-Gironde, professor of economics at University Paris 2 Panthéon-Assas and a specialist in neuroeconomics.

But few are willing to change the system. That's why progress in neuroeconomics has not yet led to many concrete applications. And yet there would be so many good reasons to move the field out of academia to solve practical problems. For instance, bringing more women into finance, especially trading, is one way we might avoid future financial crises. Women produce about 10% the testosterone of men, and the hormone does not affect their judgement. They are also less sensitive to cortisol. But a report from the Securities Industry Association states that less than 20% of Wall Street brokers are women. The researchers think that market peaks and troughs would probably be reduced if there was more endocrine diversity among traders. The neuroscientist John Coates has no doubt: "Trading floors need more women and older men, who are less sensitive to fluctuating testosterone levels." ▲

SOURCES:

"The optimism bias", *Current Biology* (2011) / "Exploring the nature of trader intuition", *The Journal of Finance* (2010) / "The Psychophysiology of Real-Time Financial Risk Processing", *Journal of Cognitive Neuroscience* (2002) / "Fear and Greed in Financial Markets: A Clinical Study of Day-Traders", *American Economic Review* (2005) / "Endogenous steroids and financial risk taking on a London trading floor", *Proceedings of the National Academy of Sciences (PNAS)*, 2008 / "Irrational exuberance and neural crash warning signals during endogenous experimental market bubbles", *PNAS* (2014) / "Cortisol and testosterone increase financial risk taking and may destabilize markets", *Scientific Reports* (2015) / "Cortisol shifts financial risk preferences", *PNAS* (2014) / "Neuroanatomy accounts for age-related changes in risk preferences", *Nature Communications* (2016)



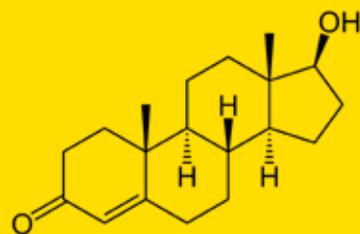
DECISION-MAKING DECODED

Understanding how the human brain makes decisions by decoding neural activity in mice via miniature electrodes: this is the mission of the International Brain Lab (IBL). This particularly ambitious project, started last autumn, brings together 21 laboratories around the world, including some of the most cutting-edge neuroscience labs. The results of IBL's work are extremely valuable to neuroeconomics researchers, who until now have been focusing mainly on functional imaging, which has more limited potential. "Imaging can tell us which regions of the brain are involved when making one decision or another, but it doesn't help us understand what the neurons are doing or derive mathematical models", said Alexandre Pouget, professor at the Department of Basic Neurosciences at the Medical School of the University of Geneva, a stakeholder in IBL.

Surprisingly, "mathematical models that describe decision-making in mice are exactly the same as those used for humans", said Pouget. Scientists can analyse neural activity in mice when they make a decision, based on the reward provided, and decipher the way in which they learn from their previous decisions. As a result, this work revolutionises the way we understand economic agents from a biological perspective. The first results of IBL's research are expected in approximately 3 years.

TRADER HORMONES

TESTOSTERONE



Several studies have shown that testosterone increases when traders make profits. But an elevated level of this steroid hormone could lead to traders taking more financial risks.

CORTISOL



A stress hormone, cortisol concentration increases for traders experiencing high volatility. Elevated cortisol over a long period of time could lead to risk aversion.

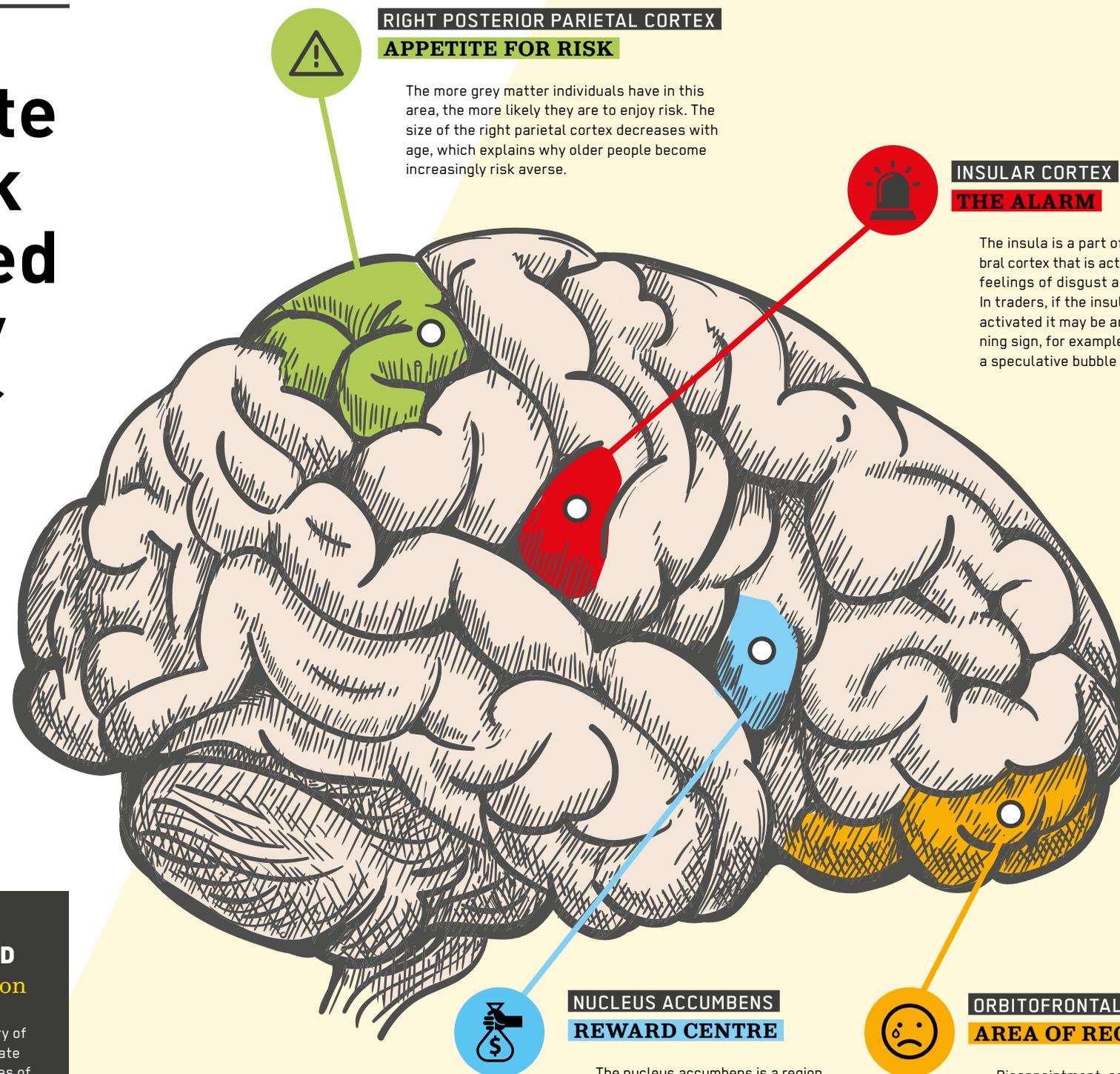
DOPAMINE



Dubbed the "pleasure hormone", dopamine is produced in the brain when a person does a habitually beneficial action, such as eating or drinking. It leads to a feeling of satisfaction that encourages the person to repeat the action. Studies have shown that financial gains lead to increased dopamine. However, people with an increased rate of this neurohormone are more likely to take risks. Consequently, dopamine has been implicated in drug addiction, as well as gambling and trading.

INFOGRAPHIC

Appetite for risk is linked to grey matter



RIGHT POSTERIOR PARIETAL CORTEX APPETITE FOR RISK

The more grey matter individuals have in this area, the more likely they are to enjoy risk. The size of the right parietal cortex decreases with age, which explains why older people become increasingly risk averse.

INSULAR CORTEX THE ALARM

The insula is a part of the cerebral cortex that is activated during feelings of disgust and rejection. In traders, if the insular cortex is activated it may be an early warning sign, for example, just before a speculative bubble bursts.

NUCLEUS ACCUMBENS REWARD CENTRE

The nucleus accumbens is a region in the basal forebrain that plays an important role in the reward circuit of the brain, as well as addiction (habituation, dependency) and pleasure. In traders, this area is particularly active when profits are made.

ORBITOFRONTAL CORTEX AREA OF REGRET

Disappointment, especially after a financial loss, sparks significant activity in this cerebral area.

THEORY OF MIND A trader's intuition

In cognitive science, "Theory of Mind" is the ability to evaluate the state of mind and desires of another person. Several cerebral regions are involved, including the left and right temporoparietal junctions, the medial prefrontal cortex and the cingulate cortex. Theory of Mind could be what gives traders their intuition.

INTERVIEW

“Traders don’t like to be tested”

World renowned researcher and author, American Paul Glimcher explains why neuroeconomics can change the future of finance.

BY LUDDOVIC CHAPPEX

THE FATHER OF NEUROECONOMICS

Considered one of the pioneers of neuroscience, American Paul Glimcher is the author of several books on the subject. His often award-winning research is based on an interdisciplinary approach that uses neuroscience, economics and psychology to understand how humans make decisions. Glimcher is director and founder of the Institute for the Interdisciplinary Study of Decision Making at New York University (NYU). He is the author of the seminal book *Neuroeconomics: Decision-Making and the Brain*, first published in 2008 and then edited and re-released in 2013. It was co-written with Ernst Fehr, professor at the University of Zurich.

The Glimcher Lab at New York University (NYU) brings together the latest developments in neuroscience, economics and psychology. Founder and head of the lab, Paul Glimcher spoke to us over the phone from his New York office.

How is neuroeconomics useful to investors?

This discipline makes it possible for us to better understand the mechanisms involved in decision-making as well as their consequences. Thanks to neuroimaging, it is possible, for example, to predict the degree of a person’s aversion to risk based on the size of its right posterior parietal cortex (see infographic on p. 47). Various studies also show that traders are strongly averse to loss and can become easily addicted to risk. Overall, we’re understanding more and more from a biological perspective just how the brain evaluates losses and gains.

“Progress in artificial intelligence could make human traders superfluous”

But these tests seem to be limited to research only. Are there concrete applications of this work in finance?

Some universities are starting to connect this to the industry. But you’re correct in that the companies which are interested in our work are first those with an interest in neuromarketing. Most banks and trading companies place far more importance in understanding global market phenomena rather than the individual behaviour of traders.

Why is that?

The industry really does not like change. And it’s well known that

most traders don’t like to be tested like subjects in science experiments. However, trading companies could benefit from new discoveries in neuroeconomics. In theory, they could define their objectives and desired risk levels for a certain portfolio and then recruit employees based on these criteria. That would make sense. But in reality, banks prefer to hire traders based largely on their past results. That said, a good track record also involves a bit of luck.

Will bank practices in this industry evolve?

In the sense that models based on neuroeconomics will become much simpler to interpret and increasingly reliable, it’s likely that this tool will gain legitimacy in coming years. Neuroeconomics would be particularly useful in optimising the efficiency of day trading. But as machines are becoming very effective in this field, I have a feeling that trading companies are gradually freeing themselves from individuals. It’s ironic in a way: just when neuroeconomics is becoming an advantage for banks, progress in artificial intelligence could make human traders superfluous...

Besides trading, how else can finance benefit from your research?

Neuroeconomics is no longer exclusively limited to studying the behaviour of one individual. It’s just a start – and this approach is still very controversial – but it’s becoming possible to expand the field of study to macroeconomic phenomena. This could help us understand how bubbles are formed, for example. A team from the California Institute of Technology (Caltech), led by Professor Colin Camerer, is experimenting with this type of tool. It is developing macroeconomic models based on individual MRI scans. Another notable evolution is that we’re no longer just talking about understanding the way people make decisions but also how they process and handle new information.

What type of information?

From authorities, for example. A classic example is the market’s surprising reaction when a central bank lowers interest rates. While low interest rates are a clear and reliable signal, consumers often don’t react for several months. They seem to be paralysed. We’re increasingly convinced that this attitude reflects certain biological limits of the attention span and comprehension of the human brain associated with decision-making. Several studies based on neuroeconomics point in that direction.

Financial risk is often the focus of neuroeconomics studies. But there are other types of risks, such as voluntarily risking one’s life... Is that the same biological mechanism?

That’s a fascinating question and very controversial. Some studies seem to indicate that there are different types of risks which are processed by different parts of the brain, and so our attitude towards risk in general isn’t necessarily the same across the board. According to this theory, someone can be very passionate about extreme sports but very risk-averse when it comes to financial investments, or the opposite. This is what Professor Elke Weber from Princeton University thinks. However, other researchers believe that propensity or aversion to risk is pretty similar regardless of the type of risk.

Do you see differences based on gender?

It’s agreed upon that women on average have a significantly higher aversion to risk than men. A lot of studies confirm this. But the reason why hasn’t yet been clearly established. Testosterone doesn’t necessarily play a decisive role. Researchers think that this difference is associated with the way men and women judge their probabilities of success: it seems that women judge their chances more modestly. ▀

FOR THE LOVE OF RISK

Adrenaline junkies, desperate for recognition, intrepid and non-conformist – big-name investors have explosive psychological profiles. Here are some profiles.

BY BERTRAND BEAUTÉ

“I’d like to put Warren Buffett’s head in an MRI to see what’s happening inside,” says Sacha Bourgeois-Gironde, professor of economics at University 2 Paris Panthéon-Assas and specialist in neuroeconomics. “Buffett always goes against the grade, avoids speculative bubbles and trends, as if his brain can ignore emotions.”

Like Warren Buffett, some investors achieve extraordinary performances, combining intuition and fact-based objectivity. At the other end of the

spectrum, others make a series of bad choices, or even totally lose control, letting losses escalate and even cheating to make more money. Countless rogue traders have jeopardised the very survival of a bank or swindled thousands of small investors. For example, in 1919 the investor Charles Ponzi set up a large-scale investment fraud, known today as a “Ponzi scheme”. Bernie Madoff used that type of scam, leading to his dramatic rise and fall. Another approach was adopted by derivatives trader

Nick Leeson to manipulate the market, leading to the collapse of the UK’s prestigious Barings Bank in 1995.

“Neuroeconomics and financial psychology are beginning to explain how decisions are made and which cognitive biases push us in one direction as opposed to another,” says Bourgeois-Gironde. Seven portraits of investors and traders are presented here to provide an insight into the psychological profiles which lead to glory...or ruin.

WARREN BUFFETT

THE ORACLE OF OMAHA

On 5 May 2018, more than 40,000 pilgrims made the trek to Omaha, Nebraska. Why? To listen religiously to the icon of triumphant capitalism, Warren Buffett, at the annual meeting of his company Berkshire Hathaway. Weighing in at \$83 billion according to *Forbes* magazine, the man captivates the crowds. Buffett Mania, it has been called.

Warren Buffett tells us the secret to his success himself in interviews and talks, ensuring his legend flourishes. The story began, as he tells it, in March 1942 when he bought his first three shares at \$38 each. Two years later, the value of these shares rose to more than \$200. But the young Warren sold them too early, pocketing a profit of just \$5. He learnt his first lesson from that adventure: “Bet on the long term.”

The 87-year-old investor, who has a reputation for penny-pinching frugality, also promotes self-confidence, despite what others may think. “You have to separate your opinion from that of the crowd... To be a successful investor, you have to ignore the fears and greed of those around you, even if it seems almost

impossible... Be fearful when others are greedy and greedy when others are fearful,” he says. And finally: “Never invest in a company that you don’t understand.”

“You have to separate your opinion from that of the crowd”

AGE: 87
NATIONALITY: AMERICAN
FORTUNE: \$83.1 BILLION (FORBES, 2018)
STATUS: ACTIVE

KWEKU ADOBOLI

THE MAN UNDER PRESSURE

Who is Kwaku Adoboli? At his trial in London in 2012, prosecutor Sasha Wass, QC, described the rogue trader as an “accomplished liar” who wanted to “increase his bonus...and his ego” because he believed he had “the magic touch” playing with UBS’s money. That got him a seven-year prison sentence. But the defendant did not say much at the trial, so no one had his version of the story. In a long article published in the *Financial Times* in 2015, Adoboli finally opened up, providing a very different side of the picture.

The son of a United Nations official, he grew up near Accra, Ghana, before travelling the world wherever his father’s job led them. He was sent to boarding school in the United Kingdom, where he is remembered as a friendly, hard-working student. “I don’t know if it was from school or his Christian upbringing...but he always wanted to help; to do things right,” one of his friends told the *FT*. “And in the end, that’s what got him into trouble.”

Fresh out of school, Adoboli started working as a trainee at UBS in London in 2003. Amid the subprime crisis in 2008, the bank lost billions and dismissed employees by the armful. Everyone in the City felt the pressure and Adoboli soon became obsessed with the markets, following the news 24 hours a day. He was sleeping three hours a night. If he had been getting enough rest, he believes he would have recognised the warning signs much earlier. “But I couldn’t do that – there was no energy left.” He was on autopilot.

Instead of admitting to the \$400,000 trading loss, he began cooking the books in 2008 and the snowball of debt rolled out of control. By 2011, the hole had grown to \$2.3 billion, and the trader could no longer hide it. In September, he came out in the open. The “miracle” he pleaded for in a Facebook post a week earlier never happened.

Released from prison in 2015, Adoboli now gives talks. “The traders I’ve met are petrified,” he told the *Financial Times*. “They’re petrified because they’re caught between a rock and a hard place. Their institutions are pushing them to make difficult choices but if they make a mistake...they will be hit with a big stick.”

“There was no energy left.” He was on autopilot.

AGE: 38
NATIONALITY: GHANAIAN
FORTUNE: NONE
STATUS: FACING DEPORTATION FROM THE UK

GEORGE SOROS

THE BILLIONAIRE OF DUALITY

It’s hard to figure out George Soros, the Dr Jekyll and Mr Hyde of finance. On one hand, he is the greedy speculator and on the other a philanthropist who lambastes the capitalist system. To understand that duality, we have to go back to the beginning. Born into a Jewish family in Budapest, the young George had to hide from the Nazis who invaded Hungary in 1944. In his book, *Soros on Soros: Staying Ahead of the Curve*, he wrote that for 30 years, all he thought about was making money, almost certainly due to his “sense of insecurity”.

To achieve his goal, he left his native country as a young man in 1947, heading for the United Kingdom and then on to the mecca of finance, Wall Street. Soros became world-famous in 1992, when he bet against the British pound. His position put so much pressure on the Bank of England that it decided to withdraw sterling from the European Exchange Rate Mechanism. Pocketing a billion dollars along the way, Soros earned his nickname as the man who “broke the Bank of England”. From that experience he took away the concept of the self-fulfilling prophecy. In other words, market forecasts cause investors to behave in ways that make predictions come true.

But all that money he made took a toll on Soros. In his book, he talks about suffering from depression in the 1980s and seeking therapy. “I was ashamed of myself,” he wrote, “but I understood there was no reason for it.” Alongside his work in finance, Soros got involved in philanthropy through his Open Society Foundations, inspired by the philosophy of Karl Popper, who believed in an open society of liberal democracy. A controversial figure, George Soros is often accused of trying to destabilise governments through a combination of finance and philanthropy. His foundation moved out of Budapest in May 2018 due to pressure from the Orbán administration.

For 30 years, all he thought about was making money

AGE: 87
NATIONALITIES: HUNGARIAN AND AMERICAN
FORTUNE: \$8 BILLION (FORBES, 2018)
STATUS: ACTIVE

JÉRÔME KERVIEL

BLINDED BY SUCCESS

Described as a “genius of fraud”, Jérôme Kerviel does not live up to his reputation. His tactics were limited to fictitious emails and unsophisticated false transactions. So how did this young man imperil the future of the French bank Société Générale by fraudulently trading up to €50 billion in assets?

Kerviel, whose mother is a hairdresser and whose father is a blacksmith, graduated from the University of Lyon with a Master’s degree, which provided little clout in the world of traders, who generally come from more prestigious universities. Was he tormented by a complex? He denies the accusation. “I knew I was valued less than the others due to my university background,” he told the judge. “But I didn’t have a problem with it.”

Yet, once let in through the back door at SG, he started taking risks as soon as he was promoted to trader. “Switching to the position of trader changed me intellectually,” he said. “My days were already intense, but then they became insane. I soon started placing hundreds of orders a day for amounts that gradually slipped out of my control,” he wrote in his book, *Downward Spiral: Memoirs of a Trader*. “On 7 July 2005, I decided to take the plunge and carried out my first big transaction. It took place during the terrorist attacks in London... All I did was make a fortune for the bank on the suffering of innocent people.”

Based on a psychologist’s examination, “the dominant experience for Jérôme Kerviel is gratification... When he won big, he was congratulated, encouraged, treated like a star.” And Kerviel was certainly highly praised. By anticipating the sub-prime crisis, he made the bank €1.5 billion in 2007. “Like many of us,” Kerviel writes, “I tended to confuse the job with a life-size board game.”

What ensued was a sort of all-in bet for €50 billion and Kerviel was handed the “Go to Jail” card for creating a €4.9 billion loss for Société Générale. He told Judge Renaud Van Ruymbeke, “I was in a virtual world. The amounts no longer had any meaning. I was caught in a downward spiral, blinded by success.”

“I was in a virtual world. The amounts no longer had any meaning. I was caught in a downward spiral, blinded by success”

AGE: 41
NATIONALITY: FRENCH
FORTUNE: NONE
STATUS: UNEMPLOYED

JAMES SIMONS

THE NUMBERS KING

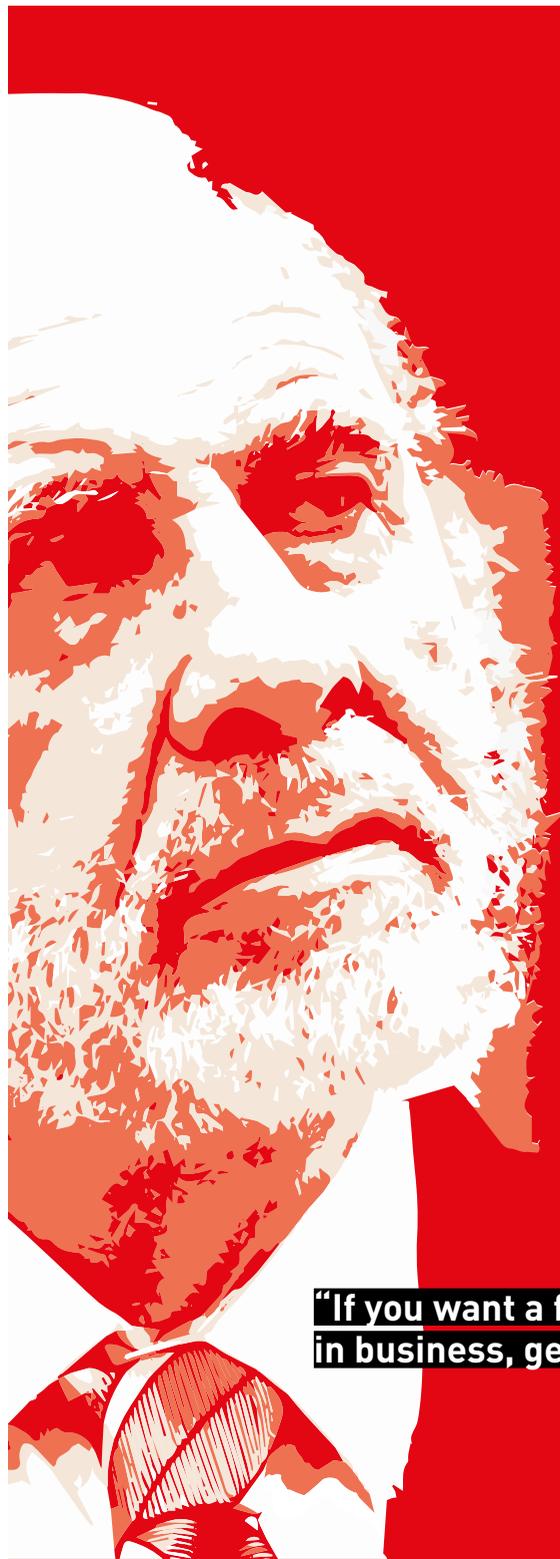
Unlike Warren Buffett, James “Jim” Simons is discreet. If not secretive. Not necessarily a household name, he is definitely one of the world’s top money-makers. Since it was created in 1988, his hedge fund Medallion has been turning profits of nearly 35% a year. Incredible to think that Simons got into finance rather late in his career, almost stumbling into it. Born in 1938, he studied mathematics at MIT. After completing his PhD thesis, the US Department of Defense spotted him and hired him to crack secret codes. But his opposition to the Vietnam War got him swiftly dismissed, so he set out on a peaceful university career.

Although Wall Street was still far away, Simons began testing algorithms on the forex market. Encouraged by his results, he left the university to focus on trading and set up his company Renaissance Technologies in 1982. By no means does he rely on flair, like an investor such as Warren Buffett. Simons only trusts the numbers. So what is his magic formula? Algorithms that detect market anomalies and immediately trigger buy or sell orders. “It only takes being right 51% of the time for it to work,” he explained in an interview with *L’Express*. As simple as that? “Of course I’m not going to tell you the various predictive signals. That’s an even bigger secret than those down at the Department of Defense,” he said in an address at MIT. He added that the real secret is: “Great people. Great infrastructure. Open environment. Get everyone compensated roughly based on the overall performance.”

Since retiring in 2010, Simons has devoted his time to his charity foundation that supports science, especially mathematics, around the world.

“It only takes being right 51% of the time for it to work”

AGE: 80
NATIONALITY: AMERICAN
FORTUNE: \$20 BILLION (FORBES, 2018)
STATUS: RETIRED



CARL ICAHN

THE RUTHLESS RAIDER

Carl Icahn firmly believes that the end justifies the means. Any means. To get an idea of who the man is, Icahn was part of Oliver Stone's inspiration for his film *Wall Street*. The unsavoury Gordon Gekko, portrayed by Michael Douglas – that's him! A Princeton graduate with a degree in philosophy, Icahn began his career on Wall Street in 1961 at the bottom of the heap. As markets rose, he made a lot of money before losing it all when the stock market collapsed. Icahn learnt a lesson: you *don't* do what everyone else is doing.

Instead of investing in healthy companies, Icahn began focusing on troubled businesses. His most famous feat was his takeover of TWA in 1985. At the time, the American airline was struggling. Icahn gradually bought 45% of the shares, then began cutting costs, slashing jobs and reducing the number of flights, before finally delisting TWA. He landed \$500 million from that deal, but the company never recovered. TWA filed for bankruptcy in 1993 then merged with American Airlines. That is how he got the reputation for being "one of the greediest men on earth".

But Icahn doesn't care. "If you want a friend in business, get a dog," he says. In the French business newspaper *Les Echos*, Icahn admitted that he is not interested in a company's traditions, jobs or staff. All that matters is money. The list of companies he has stripped is a mile long. And his strategy is always the same. Icahn buys a stake in the company, then discredits management before taking over as chief executive and maximising his returns. He is a shareholder activist who once forced the insurance company AIG to sell its mortgage insurance business, UGC.

**"If you want a friend
in business, get a dog"**

AGE: 82
NATIONALITY: AMERICAN
FORTUNE: \$18.4 BILLION (FORBES, 2018)
STATUS: ACTIVE, FORMER ADVISOR
TO DONALD TRUMP

BERNARD MADOFF

THE CROOK OF THE CENTURY

"I did as best I could, but I don't understand," Robert de Niro admitted on release of the made-for-TV film *The Wizard of Lies*. The actor harnessed his talent to physically transform into Bernie Madoff, but no, he never managed to really understand the man. "What he did is beyond my comprehension." For nearly 20 years, Madoff sold his clients investments that handsomely outperformed the competition. The problem was, he never invested anything. Instead, initial investors were fed returns with the money of investors who came later.

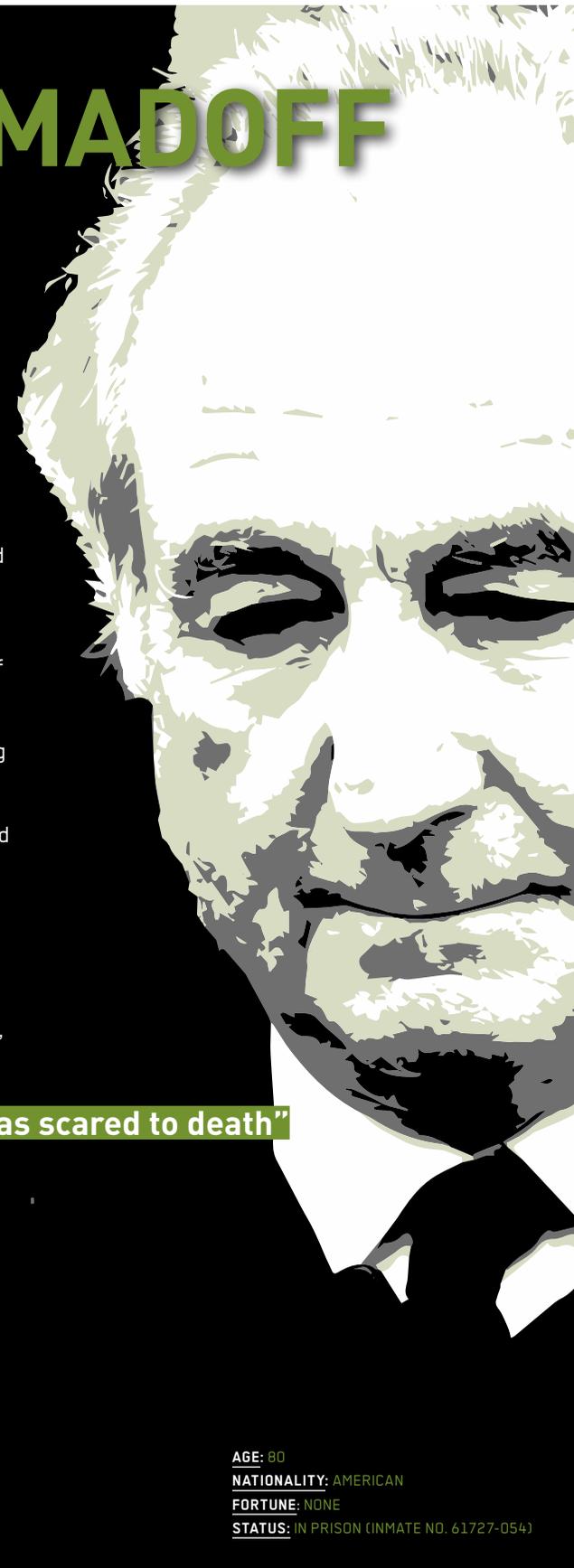
In an interview with the *Financial Times* in 2011, Madoff tried to explain why he did it. "I started with \$500 in capital. I watched my father go bankrupt. I was very driven. But I was always outside the club, the club being the New York Stock Exchange and white shoe firms." In an interview with *GQ* magazine, he said, "I was just this little Jewish kid from Brooklyn. The institutions controlled everything, and some kid out of nowhere had no chance of making it. It made me sick."

At the height of his legitimate career in 1991, Madoff started a side business, promising his investor clients 15% returns, while his fund actually maxed out at 2%. "I was scared to death," he said in the *FT*. From one first lie, things escalated. It was a nightmare. "Put yourself in my place. Having to keep that secret, going home every night, not being able to talk to your wife about it...having that hanging over your head... How could I do that? I was making a lot of money. I didn't need anything more," he says. "Outside, everyone says I'm a sociopath," the inmate (no. 61727-054) told the *FT* before adding, "I'm a good guy."

His downfall was triggered by the 2008 crisis, as his clients wanted their money back, causing the whole system to collapse. Madoff was arrested and in 2009 sentenced to 150 years in prison without parole. His crime, which sucked up almost \$65 billion, is the largest financial fraud of all time.

"I was scared to death"

AGE: 80
NATIONALITY: AMERICAN
FORTUNE: NONE
STATUS: IN PRISON (INMATE NO. 61727-054)



THE DEATH OF *HOMO ECONOMICUS*

Experiments in behavioural finance are questioning the dominant economic theory and astute investors are already taking advantage of them.

BY BERTRAND BEAUTÉ



A doctor views a patient's brain scan on a computer screen at a neurology clinic.

“Our choices are disrupted by several cognitive biases. We are led by our emotions, beliefs, intuitions and social norms”

Mickaël Mangot, economist and founder of BEFI consulting

the price at which consumers will no longer buy a product and as a result, companies can maximise margins. But this economic paternalism brings about doubt and fear, especially since the next step no longer seems very far away. Let's go back to our 10 Swiss francs. Scientists have demonstrated that people who offered an equal share showed increased activity in their prefrontal cortex. This information led some specialists to imagine, for example, that in the future, traders could be chosen based on their behavioural biases, with the help of brain imaging. “Developments in neuroeconomics must be accompanied by serious ethical discussions,” warned Sacha Bourgeois-Gironde, a specialist at Université Paris 2. “Especially since a physiological particularity can explain a tendency to act in a certain way, but can never predict with certainty how a person will behave.” ▲

Imagine the following game: someone gives you 10 Swiss francs. You can keep some of it as long as you share with someone else. You can split the money however you'd like: nine francs for you and one for the other person or five francs each or any other combination. But if the second person refuses your offer, you both lose all 10 francs. The dominant economic theory, known as “neoclassical”, suggests that the first person would give the minimum possible and the second would accept it. For the second person, one franc is better than none, after all, and should understand that the first person is just maximising their profits. The problem is that in reality, it doesn't work like that. Studies have shown that most of the time, the second person declines any amount less than half

and the first person, anticipating the refusal, will give more than the minimum amount.

“The dominant economic model was designed as if people made their decisions with the sole purpose of maximising their personal gain,” said Mickaël Mangot, economist and founder of BEFI consulting. “But that is entirely untrue. The completely rational Homo Economicus doesn't exist. Behavioural finance shows that our choices are disrupted by several cognitive biases. We are led by our emotions – such as anger or jealousy – beliefs, intuitions and diverse social norms.”

Scientists have established a whole repertoire of behavioural biases that lead us to make decisions that are not optimal for either us or the general interest. “Thinking that the

market self-regulates and that we can trust it is an illusion. Studies have shown that the individual and collective behaviours of traders play an important role in volatile markets and the creation of speculative bubbles,” said Sacha Bourgeois-Gironde, professor of economics at University Paris 2 Panthéon-Assas and a specialist in neuroeconomics. “To avoid crises, it's not enough to simply monitor how financial markets function. The classic market models also need to include the cognitive biases that traders fall victim to.”

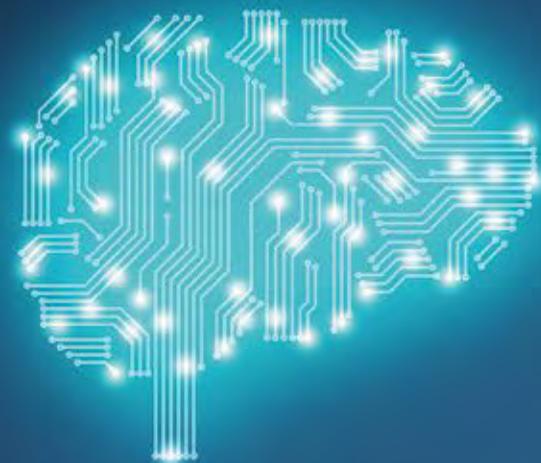
For the time being, the dream of recreating the dominant economic model with the behavioural paradigm isn't yet a reality. But several companies are starting to take an interest in it. Banks such as JP Morgan, for example, are already applying strat-

egies from behavioural finance in order to grow their profits. Concretely, banks need to identify and correct their traders' biases and/or take advantage of biases of others, particularly by picking up shares that are poorly priced because investors had an inappropriate reaction to them. “I often hold training sessions for portfolio managers to identify their biases and learn how to discover other people's biases,” said Mangot. “This is important, because cognitive biases lead to market anomalies that investors can take advantage of.”

Finance isn't the first field to take an interest in this subject. For the past few years, companies have been working on behavioural economics in order to refine their marketing strategies. For example, behavioural economics can be used to identify

SCIENCE USED FOR CIVICS

Several countries are applying behavioural science theories when establishing public policies. They use nudges designed to counteract behavioural biases. One example is a fly drawn at the bottom of a urinal. With this simple tactic that encourages men to aim better, the Amsterdam Schiphol Airport was able to reduce its cleaning expenses for toilets by 8%. Playing on social norms, the UK tax authority collected £2.8 million by writing on reminder letters that “nine out of 10 people pay their taxes on time”.



WHEN ROBOTS REPLACE TRADERS

Machines have invaded finance and trading. A race for the best algorithm is ongoing, even though humans still have some cards left to play.

BY MARTIN LONGET

Analysts thought it would never happen, and yet here we are. On 23 June 2016, the UK voted on whether or not they wanted to remain in the European Union. Assuaged by the latest polls, the markets expected a “no” vote for Brexit. The morning after, once the dust had settled, analysts were shocked and hedge funds suffered significant losses. But one fund, at least, was still standing. For the election, Japanese fund Simplex decided to experiment with a cutting-edge trading computer. The machine predicted what most analysts considered impossible: it bet that voters would choose to leave the EU, based solely on technical market indicators. As a result, the fund jumped 3.4% on 24 June, which is now known as Black Friday. On the same day, the Nikkei index was down 7.9%.

They are rational and impervious to stress and fatigue – are trader robots in the process of replacing the human brain? It’s not exactly science fiction anymore. Millions of purchases and sales happen every second. According to various studies, between 70% and 90% of the world’s market transactions are conducted by algorithms. “Everyone started doing it about 15 years ago, with varying amounts,” said Christophe Lamon, director and co-founder of consulting firm SwissmeFin.

A pioneer in the field, the Renaissance fund (read the feature on James Simons on p. 47) performs

above market average. “The digitisation of all economic sectors relies on data analysis and management,” said Nathalie Feingold, founder of npba, a consulting firm specialised in data management. “The idea is simple: give a machine lots of information and fine-tune the filters until you get relevant correlations and therefore correct decisions.”

“Many people were kicking themselves and had to close up shop”

Christophe Lamon, director and co-founder of consulting firm SwissmeFin

Some robots – dubbed semantic robots – scour the web in search of a wide variety of data, such as economic and market indicators of course, but also annual reports from companies and NGOs, as well as millions of news briefs, articles and social media posts. The goal is to create increasingly refined algorithms in order to detect trends and alerts before the rest of the market becomes aware of them. The tricky part is eliminating noise, or irrelevant data and results that are hiding the rare pearls of useful information.

Whoever comes up with the latest and greatest algorithm that is better than its competitors’ is at a distinct advantage. “As soon as an improve-

ment is made, all other players will copy it,” said Lamon. “Everything moves really fast.” Sandro Saitta, chief industry advisor at the Swiss Data Science Center (a skills centre founded by EPFL and EPFZ), agrees: “Most of the technology is open-source, often coming from university research. Algorithms are generally written in open-source programming languages such as R or Python..”

The challenge for engineers is to start with a common knowledge base and then add their own algorithms, depending on the industry and the results they’re looking for. These algorithms must be constantly improved, otherwise they will lose their strategic advantage. “To stand out, developers need to be able to connect with the best data scientists, which are rare and very sought-after positions,” said Saitta, who is also president of the Swiss Association for Analytics.

It also goes without saying that failure is very costly: “The goal is obviously to generate long-term profits, despite the significant investments needed for algotrading,” said Lamon. “Many people were kicking themselves and had to close up shop when they realized their so-called revolutionary algorithm didn’t bring them the revenue they hoped for, or even worse, underperformed traditional trading methods. Good traders who are well-informed and on top of activities in their investment universes are still often stiff competition for machines.”

“THE POTENTIAL OF ARTIFICIAL INTELLIGENCE IS IMMENSE”

Trading robots are progressively replacing humans. Serge Kassibrakis, head of Quantitative Asset Management at Swissquote, explains how these tools work and what we can expect in the future.

Immune to emotions, stress and fatigue, trading robots have lots of advantages. What are the avenues for future improvements?

There are many different improvements in the works. To understand this phenomenon, it is helpful to remember that currently, these robots, commonly called ROBO-ADVISORS, are mainly portfolio optimisation algorithms that act at regular time intervals based on market events. Taking into account the client's constraints and objectives, the algorithm builds an ideal portfolio: it will maximise expected yields for a given risk level. That's what Swissquote's ROBO-ADVISOR does. The first step in terms of improvement is to perfect the algorithm itself, making it more stable, robust and precise. There's a lot of intense research involved in this.

The other area for improvement is the growing ability of what we call machine learning to determine certain aspects of human behaviour. GAFA has had incredible success in this domain. Facebook generates revenue based on its ability to predict the probability of someone buying something and then maximising it by showing the right advert to the right person at the right time. It is therefore possible

that machine learning could soon help ROBO-ADVISORS to determine clients' true risk aversion or identify a change in degree of this aversion, simply by observing their behaviour.

Given that most of these technologies are currently open source, what is the room for manoeuvre for a company like Swissquote to stand out from its competitors?

These algorithms, whether they are based on optimisation or machine learning, are not a plug & play type of tool. The same algorithm used by two different companies could come up with two different results based on what each company puts in. Furthermore, these algorithms rely on a large number of free parameters and so it is up to each company to shape its results based on its experiences and vision.

With machine learning algorithms, a company can bring even more added value. The algorithm's effectiveness is strongly linked to the relevance of the data used. Given that Swissquote's historical core business is financial information, we are well-positioned to use large amounts of quality data. The potential of artificial intelligence is immense.

Can you describe the types of Swissquote employees who are developing these tools?

We mainly have mathematicians, physicians and financial engineers. But we hope to get involved with evolutionary biologists, mathematicians specialising in theoretical computer science and psychologists.

What will happen when machines are able to learn? Will they definitively replace the human brain?

Machines have always had predictive capabilities. The paradigm shift is that the models are being replaced or supplemented by algorithms that are directly learning from data. One can imagine that some algorithms will be able to make more reliable, precise and increasingly long-term predictions about the behaviour of markets and players. But in the years to come, humans will always play a role in customer relations, as well as in configuring and controlling these algorithms. ▽



SERGE KASSIBRAKIS
HEAD OF QUANTITATIVE
ASSET MANAGEMENT
SWISSQUOTE BANK

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THE MULTI-CURRENCY CREDIT CARD IS HERE

Swissquote's newest innovative offering is the Multi-Currency Credit Card. The best part: zero processing fees when making purchases in dollars, euros, pounds or yen. Twelve currencies are available.



[SWISSQUOTE.COM/ONE-CARD](https://www.swissquote.com/one-card)

What is the advantage of this new card?

Cardholders can make purchases in 12 different currencies with no processing fees. Payments are made directly in the foreign currency. The idea is to offer our clients an additional service, as we have many clients who travel and make purchases in foreign currencies on the internet.

What are the requirements for this card?

People who are interested just need to have a trading account with Swissquote.

What are the 12 currencies available?

The Swiss franc, euro, dollar, pound, yen, United Arab Emirates dirham, Canadian dollar, Australian dollar, Hong Kong dollar, Swedish kroner, Danish kroner and Norwegian kroner.

Concretely, how does the card work?

It's very simple. If a client wants to use their card in the United States, for example, to make a purchase, US dollars will be directly pulled from their multi-currency account on the first working day of the following month. If, on that date, the client doesn't have enough funds to cover the transaction, they will overdraw the account. Clients can then pay for their purchases with a bank transfer or a foreign exchange transaction [either manual or automatic] at a better rate than at most banks or foreign exchange companies. It is also very convenient.

What are the main differences between the Silver and Gold models?

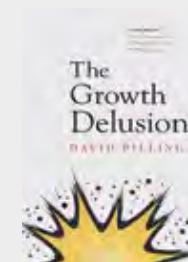
The Gold card offers travel insurance and allows clients to take out more

cash. Another notable advantage: for each purchase, 1% of the amount is deposited back on the user's account as Trading Credit, compared to 0.5% with the Silver card. The two versions are available free for the first year. From the second year annual fees are 100 Swiss francs for the Silver card and 200 francs for the Gold card. ▲



LINO FININI
HEAD OF BACK OFFICE & BA
SWISSQUOTE BANK

TO READ, TO DOWNLOAD



From CHF 20.-

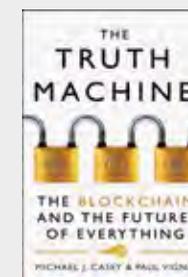
THE GROWTH DELUSION

THE WEALTH AND WELL-BEING OF NATIONS FINANCIAL EVOLUTION AT THE SPEED OF THOUGHT

By David Pilling

(Bloomsbury Publishing, 2018)

Gross Domestic Product isn't a reliable indicator of economic growth. This isn't a new opinion, but it takes on an entirely new significance in the hands of David Pilling, a journalist at the *Financial Times*. His latest book, *The Growth Delusion*, demonstrates the futility of GDP, as the calculation methods exclude entire sections of the global population – such as housewives or small farmers – from wealth generation, while accounting for the proceeds of crimes. Far from a simple critique, this fascinating book offers solutions that are more suited to contemporary demands.



From CHF 40.-

THE TRUTH MACHINE

THE BLOCKCHAIN AND THE FUTURE OF EVERYTHING

By Michael J. Casey and Paul Vigna

(St. Martin's Press, 2018)

Brought to light by the emergence of bitcoin and cryptocurrencies, blockchain technology is actually much more than a hypervolatile market with uncertain developments. Journalists Michael J. Casey and Paul Vigna use their latest book to explain how blockchain is preparing to revolutionise all our economic relationships. This technology can record and validate large amounts of a wide variety of information in a decentralised way – therefore making it tamper-proof. The authors predict that this revolution will cut out the “cost of trust” represented by fallible intermediaries such as banks and law firms.



Free
App Store

HOUSECRAFT

REVAMP YOUR HOUSE

Transforming the interior of your home without hiring the costly services of a decorator or designer is now possible thanks to Housecraft, an app that uses augmented reality to display an immediate mock-up of your wildest apartment decorating ideas. The app allows for lots of customisations, giving free rein to your imagination in terms of furniture type, shape and colour.



Free
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Google Play

SEEK BY INATURALIST

NAME THAT PLANT

Finally, the app that nature-walk fans and plant lovers have been waiting for. Spotted an unknown flower or a rare plant? Seek scans and compares photos of plants against its immense database to determine the type and species of plant or flower. The app's fun interface, where users can win points and prizes for finding new plants, will also attract gamers.



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Google Play

BROWSE BY BARNES & NOBLE

THE READING CORNER

A cross between a social network for readers and a bookshop, Barnes & Noble's app is the best new platform for frequent readers looking for inspiration and new book suggestions. Browser hosts a community-based question and answer forum, and also allows readers to buy books through the Barnes & Noble online shop.



Free
(requires a GPS tracker and a mobile subscription)
App Store
Google Play

PETPOINTER

A GPS FOR FIDO

This app lets you track your pet via satellite – even to the nearest metre. It's a practical way to find your cat without having to post the traditional “lost cat” signs around the neighbourhood. Owners can also follow their pet's travels over several days in order to discover its favourite paths (and realise it's a creature of habit). The app is free, but users need a GPS tracker from Swiss company Petpointer (the tracker is about half the size of a matchbox and attaches to the pet's collar) as well as a data subscription to transmit GPS data.

REVOLUTION IN THE SKY

A whole host of innovations is transforming the small civilian helicopter industry to the point where flying cars are no longer a futuristic dream. In order to avoid the “Uberisation” of the industry, large aeronautics groups are pumping out the prototypes.

BY BERTRAND BEAUTÉ



Equipped with 18 propellers, the flying taxi from German company Volocopter had its first demonstration flights.

In 2002, Elon Musk’s launching of SpaceX was met with general indifference. Industry behemoths (Airbus, Boeing, Lockheed Martin) didn’t pay much attention to the California start-up trying to revolutionise access to space. Fifteen years later, everything has changed. SpaceX has become the world leader in commercial satellite launches – ahead of European company Arianespace – and now, no one dares snub start-ups in the aeronautics industry. “Elon Musk woke us up with SpaceX,” said Jean Botti, former head of innovation at Airbus, in a 2015 issue of *L’Usine Digitale* magazine.

One of the markets that could be affected in the short term by innovative start-ups is the small civilian helicopter industry. “We’ve reached a turning point,” says François Chopard, director of incubator Starburst Accelerator and investment fund Starburst Ventures. “Many technologies are now available and in the next five to 10 years, we’re going to see a new type of helicopter in the sky. The industry is booming and all the players are trying to keep up.”

“UBERISATION” OF THE SKIES

The first example of this is already happening. Inspired by Uber’s business model, American start-ups, ▶

Half-plane, half-helicopter, the Cora prototype, developed by Zephyr Airworks, is tested in New Zealand. The first commercial flights are scheduled to begin in three years.



CORA

Acquired by Geely, Volvo's parent company, the American start-up Terrafugia aims to commercialise its flying car in 2019.



TERRAFUGIA

The French start-up Technoplane is currently seeking funds to make a prototype of its 'Mini-Bee' model. This device has the particularity of being equipped with a hybrid engine.



MINI-BEE

Completely autonomous, the Chinese drone Ehang 184 made its first test flights with passengers in February 2018. No launch date has been put forward by the company.



EHANG

Developed by Airbus, with the support of the car manufacturer Audi, the Pop.Up Next shuttle drone was presented at the Geneva Motor Show. According to its designers, it could become reality within a decade.



AIRBUS

such as New York's Blade, launched on-demand helicopter services in US cities as early as 2015. Passengers can reserve a helicopter for a specific flight via an app, just as they would to order a car with Uber.

Not wanting to be left behind, helicopter manufacturers moved fast: in April 2017, Airbus Group launched its Voom platform in Sao Paulo, Brazil, where passengers can reserve a helicopter with their smartphones. With more than 500 heliports and 12 million people, the congested city, with its endless skyscrapers used by helicopters as operating bases, is perfect for the industry. In fact, Voom was such a resounding success that it will now be launched in other big cities. As of April 2018, the service is now available in Mexico City. The second largest player in the helicopter industry - US-based Bell - is stepping up its game as well. In February 2018, it announced a partnership with Uber to develop heli-taxis.

This "Uberisation" of the skies also demonstrates that helicopter pilots are looking for new avenues of work, as they no longer can afford not to. Since 2013, the large civilian helicopter market has been losing altitude, tumbling into a crisis (see inset on p. 70). In this context, developing innovative services could bring in additional income. "For the time being, heli-taxis are a niche market, available only to VIPs, since operating a traditional helicopter is still expensive," says Chopard. "Furthermore, many cities and countries are against this transport method becoming more widespread because of the noise and pollution it causes." In Brazil, a 15-minute trip booked through Voom costs 380 Brazilian reals, or around 105 Swiss francs - which isn't incredibly expensive but nonetheless means that the service remains inaccessible to the majority of the local population. In several cities, including Paris, this type of service is banned altogether.

In order to reduce travel costs and pollution, several start-ups are working to completely overhaul the structure of traditional helicopters. They're developing multicopters, which look very similar to the miniature drones that can be found on supermarket shelves. The E-Volo Volocopter 2X, from German company Volocopter, has 18 propellers and nine independent batteries.

Several start-ups are working to completely overhaul the structure of traditional helicopters

The two-seater aircraft received an airworthiness certificate in Germany in early 2016, becoming the first device of its kind to receive a flight permit. The Volocopter 2X is expected to be on the market in late 2018 for approximately \$400,000.

Other companies are working on very advanced projects as well. Germany's Lilium is building a jet with 36 electric motors and California's Joby Aviation is developing an aircraft powered by 16 propellers that can pivot 90 degrees. As these are no longer really helicopters, experts call them VTOLs (Vertical Take-Off and Landing Aircrafts).

EASY TO FLY

"Just three years ago, no one was even talking about electric VTOLs," says Jean-Louis Dropsy. "Now, these aircraft are the next big thing and there are so many prototypes. It's a real trend in the industry." Xavier Duterte, founder of Technoplane, agrees: "We've seen a significant uptick since 2016 as everyone tries to find the best architecture possible for the helicopters of the future.

Electric multicopters have several advantages over traditional single-rotor models. Besides the greenhouse gas emissions, maintenance costs, which are a determining factor, are much lower. Multicopters are also much easier to fly." The E-Volo is piloted with a simple joystick, with its controls essentially made up of left, right, up and down.

"Around the world there are about 60 start-ups developing multicopters and around 15 of them are actually operational," says François Chopard. "And all the big companies are developing their own projects." Airbus, for example, is developing CityAirbus, an electric quadcopter whose first flight is expected in late 2018. Boeing acquired Aurora Flight Sciences from right under Uber's nose in late 2017; the company is developing a 24-propeller prototype.

Why are there so many mergers when it comes to these flight projects? "Uber served as an educator and catalyst for the industry by offering an outlet for these aircraft. Now everyone believes in the business model of the heli-taxi, which is a completely new market," says Chopard. "Demand is estimated at between 500 and 1,000 vehicles per city in the next 20 years. And there are 500 big cities in the world. If you do the maths, it's an industry worth several billion dollars a year." In a 100-page whitepaper published in October 2016, Uber described its vision of the ideal VTOL: a four-seat model, flown by a pilot, that can take off and land vertically in urban environments with a top speed of 250 km/h.

"The technical barriers to creating such an aircraft are decreasing," explains Duterte. "We already have all the necessary technologies - miniaturisation, batteries, artificial intelligence - to make VTOLs fly. But there are still roadblocks to VTOLs becoming truly widespread, especially battery life." With its nine ▶

COMPANY STATS

FOUR HEAVYWEIGHTS DISRUPTED

AIRBUS HELICOPTERS, THE LEADER

In a sluggish heavy-lift market, the global helicopter leader is faring better than its competitors, with a 50% market share, 335 net orders and 409 deliveries in 2017. These figures are down just slightly from 2016. To avoid missing out on the autonomous helicopter revolution, Airbus is developing no fewer than three projects within the company and has opened a research centre in the heart of Silicon Valley. Dubbed "A3", the centre is a way to keep the company up to speed on the latest discoveries. "With its experience, Airbus is well-positioned to maintain its place as an industry leader," says Bertrand Vilmer, founder of consulting firm Icare Aéronautique.

HEADQUARTERS: MARGNANE (FR)

EMPLOYEES: 20,200

2017 REVENUE: € 6.45 BILLION



SIKORSKY, THE MILITARY COMPANY

Of the four global giants that dominate the helicopter market, Sikorsky is the least involved in the civil sector. The US-based company makes 80% of its turnover from the military - a sector that's very dependent on orders from the Pentagon. As a result, Sikorsky almost went under in 2015 before being acquired by Lockheed Martin for \$9 billion. The acquisition could lead Sikorsky to accelerate the electrification and automation of its aircraft, since Lockheed is very active in the military drone sector.

HEADQUARTERS: STRATFORD (US)

EMPLOYEES: 15,000

2015 REVENUE: \$4.5 BILLION





Supported by Tencent, the Chinese internet giant, the German start-up Lilium has designed landing platforms on the roof of skyscrapers to accommodate its flying taxis.

easier than developing self-driving cars. "There is far more space in the sky than there is on land and fewer unpredictable events, such as pedestrians crossing without warning," says Chopard. "I believe that it would be quite easy to have just as many helicopters in the sky as we have cars on the road." The market would be worth hundreds of billions, which justifies the enormous investments that we're seeing today. It also justifies the interest from auto manufacturers, who don't want to miss the shift to flying cars, especially since they snubbed Tesla's electric vehicles.

Chinese giant Geely, which owns Volvo, has acquired Terrafugia. Daimler is working with Germany's Volocopter. Joby Aviation raised \$100 million with the help of Intel and Toyota in particular. Google, which is working on a self-driving car, is also interested. Co-founder Larry Page is supporting Zephyr Airworks, a start-up that is currently testing a small autonomous aircraft in New Zealand. Airbus is developing no fewer than three projects internally (CityAirbus, Vahana and Pop.Up Next).

But it remains to be seen who will emerge as the leader in flying cars: "Large companies such as Bell and Airbus have the advantage of practically unlimited funds. But they don't move very quickly," explains Dropsy. "With support from companies such as Uber and Google, start-ups can absolutely make it in the industry. One of them could make a big discovery."

While European firm Airbus's prototype Vahana has just made its successful maiden flight, China's Ehang seems far more advanced. In February 2018, its autonomous quadcopter Ehang 184 made its first trips with passengers. While the Chinese company hasn't released a market date for its model, Dubai is hoping to launch the Ehang 184 this summer, in order to give the city the first drone transport service in the world. And you thought this was all science fiction. ▀

THE HEAVY-LIFT MARKET PALES IN COMPARISON

While the small civilian helicopter market is currently booming, the same can't be said for the helicopter industry as a whole, with the majority of the industry, in terms of revenue, made up of medium and large aircraft. "The gas and oil industries have been stagnant since 2013, which is bringing the helicopter market down," explains Bertrand Vilmer, founder of consulting firm Icare Aéronautique. "The fall in oil prices led to oil companies purchasing fewer aircraft, as the oil industry uses helicopters to resupply offshore oil platforms." As a result, orders of new civilian aircraft fell 20% in 2017 compared to 2016.

But according to a study by Airbus Helicopters published in October 2017, the market is nevertheless expected to pick up again, boosted by developing countries and mature markets needing new equipment. The aircraft manufacturer expects that nearly 22,000 new traditional helicopters will be delivered between 2017 and 2036, which will be worth €370 billion. "I don't expect to see the civilian sector picking back up again until two or three years from now," says Vilmer. "In the military, however, demand could increase, as conflicts are becoming increasingly asymmetrical. When in combat with small groups, a helicopter is a decisive tool."

batteries, the Volocopter 2X, for example, can only be in the air for about 15 minutes, meaning a maximum of around 30 kilometres – far enough for trips within a city, but not necessarily sufficient to create a profitable flying taxi service.

But experts aren't concerned. "Battery life will improve over the coming years, especially since the aeronautics sector will benefit from advances in the auto industry, which is investing heavily in battery research," continues Duterte. In the meantime, just as was the case with cars, hybrid models will be able to ensure the transition. For example, US company Terrafugia is developing a vertical take-off aircraft with two electric motors for take-off and landing and a combustion turbine for flying. The quadcopter Mini-Bee, from French company Technoplane, also has a hybrid motor.

SELF-FLYING AIRCRAFT?

"The first commercial aircraft, both hybrid and fully electric, should be on the market by 2022-2023 in large cities that permit helicopters, such as Los Angeles," says Chopard. "They will first be flown by pilots, and then by autonomous drones." Of course, the holy grail would be the self-flying car. But many are quite sceptical of the idea: "It's a joke," says Bertrand Vilmer, director of consulting firm Icare Aéronautique. "We're slowly making it to self-driving cars. But a flying aircraft is far more complex. When it malfunctions, it's not possible to pull over on the side of the road. It would crash, leading to losses and damage."

"There are psychological and regulatory barriers to self-flying aircraft," says Jean-Louis Dropsy. "But from a technical standpoint, we're not too far off." And in some ways, it's even

LEONARDO, THE STRUGGLING ITALIAN COMPANY

The helicopter division of Italy's Leonardo, which makes up 30% of its turnover, is experiencing serious turbulence. To bounce back, Leonardo is focusing heavily on the concept of tiltrotors, especially with its AgustaWestland AW609 which is in the process of being certified. With two propellers, the model takes off vertically like a helicopter. But then the two rotors turn 90°, transforming the copter into a plane-like aircraft for the cruising flight. Leonardo has also joined the Clean Sky initiative to develop cleaner – and in particular, electric – models.

HEADQUARTERS: ROME (IT)

EMPLOYEES: 11,800

2016 REVENUE: € 3.63 BILLION

✓LDD

BELL, UBER'S PARTNER

A subsidiary of US-based Textron, Bell Helicopter is the second-largest company in the civilian helicopter industry, with an 18% market share. In 2017, Bell did quite well despite the crisis; turnover was \$3.32 billion, compared to \$3.24 billion a year earlier. Bell has partnered with Uber to develop a multicopter. "It's a smart partnership," says Jean-Louis Dropsy, Aerospace and Defense director at Argon Consulting, an independent consulting firm. "Uber, which is not part of the aeronautics industry, will do what it takes to advance quickly. It also has a business model."

HEADQUARTERS: FORT WORTH (US)

EMPLOYEES: 8,000

2017 REVENUE: \$3.32 BILLION

✓TXT

The dreamlike hole number 16 of the Royal Golf Course in Vale do Lobo offers breathtaking views of the Algarve's ochre cliffs.

TRAVEL

The Algarve, the gem of Atlantic golf

Known for its luxurious beaches, the southernmost region of Portugal is an ideal place to work on your swing.

BY STANISLAS CAVALIER



VALE DO LOBO

Portugal in April: a feeling of seaside relaxation floats in the breeze. Crowds of tourists haven't yet invaded the beaches, but gentle sunny warmth and blue skies have already arrived. The temperature is ideal for getting out your golf clubs and exploring the exquisite greens that stretch along the Atlantic coast on the south-western tip of Europe. Welcome to the Algarve. "This region is paradise

for golfers," says Americo Lopes, managing partner of Golf-trotter, a golf-specific travel site. "The perfect climate, with more than 300 days of sun per year, allows golfers to play year round. Moreover, they can take their pick of various settings, either seaside tee times or inland rounds, thanks to the incredible amount of courses in the area – about 40 within 100 km. There are also courses for all skill levels, from beginner to professional." >



The pools at Anantara Vilamoura Resort overlook the lush greens of the Victoria. Ideal for relaxing between two putts.

VILAMOURA

Many of these courses are in protected areas with spectacular panoramic views and most were designed by internationally renowned architects such as Jack Nicklaus, Arthur Hills and Nick Faldo. It's not surprising, then, that in January the Algarve was ranked "Best Golf Destination in Europe" for the second consecutive year by UK magazine *Today's Golfer*, as well as having been voted "Best Global Destination" several times by the IAGTO (International Association of Golf Tour Operators).

The best of the best is Vilamoura, the beating heart of the Algarve's golf. Known for its vast marina, this seaside city slightly sold itself out to tourism starting in the 1960s. Gaudy hotels and uninspired buildings overlook the beach. To find a bit of peace and quiet, get out of

the city. Only a few kilometres away are the 90 hectares of the Victoria Golf Course, one of the most famous courses in the region. Designed by the legendary Arnold Palmer, this 18-hole course hosts the Portugal Masters – one of the best-regarded competitions in Europe – every year.

The west coast of the Algarve is better hidden from mass tourism

But beware: with its numerous water features and rolling fairways, the Victoria is a technical course. "Not everyone will be able to make a birdie

or an eagle," smiles Lopes. Advice from Tomas Carlota, the resident golf guru, will be particularly welcome for golfers hoping to improve their swing and see how they play on a state-of-the-art course. Others will enjoy the inviting country club and the beautiful grounds filled with olive, carob and almond trees.

Next to Victoria are other remarkable courses, such as the venerable and more affordable Vilamoura Old Course. Known for being the second-oldest course in the Algarve, this 18-hole, designed in 1969 by Franck Pennink, takes players on a journey past impressive stone pines and through gently rolling hills.

Finally, if only for the souvenir photo, it's simply a must to play the Vale do Lobo Royal Golf Course,

BETWEEN TWO PUTTS

As Portugal's top destination, the Algarve suffers from mass tourism. The central coast between Lagos and Faro is now lined with villas, hotels and restaurants. But the region's 250-km coastline still has some hidden escapes. The Praia da Marinha, a beach accessible via a staircase, is fabulous for snorkelling. The Praia do Camilo, a sandy cove close to Lagos surrounded by ochre cliffs and turquoise waters, is an enchanting sight. A labyrinth of canals, islands, marshes and sandbanks, the Parque Natural da Ria Formosa is renowned for its flora and fauna, especially the large number of migratory bird species that use it as a stopover.

Note that the west coast of the Algarve is better hidden from mass tourism. There you'll find cliffs and the Cabo de São Vicente monastery with stunning views of the Atlantic. The inland region is scattered with fortified cities and historic villages to explore, such as Salir and Alte. If you're looking for delicious treats, the Mercado Municipal de Loulé, a beautiful building constructed in 1908, offers many local products, including fish and seafood, orange blossom honey, fig cheeses and several varieties of the piri-piri spice. While at the market, explore the Nossa Senhora da Conceição chapel, built in the 17th century, and admire the walls covered in azulejos – hand-painted blue tiles.

The turquoise waters of Praia da Marinha offers an idyllic setting for snorkelling.



LUXIE HEGDAMERKAN

whose signature 16th hole is certainly one of the most photographed in the world. For a par 3, golfers must make a nearly 200 m shot in order to reach the green, sending the ball over three ochre cliffs that overlook the beach below. It's a challenge that any self-respecting golfer has to try at least once. "My favourite hole is the 16th at the Royal," reveals Jarmo Sandelin, a former professional golfer from Sweden. "It's one of the most difficult holes in the world if you're facing the wind." And certainly one of the most beautiful. ▀

WHERE TO STAY

Anantara Vilamoura

Overlooking the luxurious greens of the Victoria, the Anantara Vilamoura Algarve Resort is perfectly located for golfers. Free shuttles are available to the nearest greens, and the hotel's three pools, as well as its magnificent spa, are an ideal spot for a little relaxation after making your putts.

Starting at 250 Swiss francs per person per night.

Hilton Vilamoura

With a direct view of the Vilamoura Old Course, the Hilton is an excellent place to practice your swing.

Starting at 200 Swiss francs per person per night.

GETTING THERE

Flights to Faro from Zurich and Geneva.

Starting at around 100 Swiss francs per person.



MOTORCYCLES

A green revolution on two wheels

BMW RELEASES AN ELECTRIC MAXI SCOOTER

BY PHILIPP MÜLLER



MAX POWER: 48 HP AT 4,650 RPM
MAX TORQUE: 72 NM FROM 0 TO 4,650 RPM
0 TO 100 KM/H: 6.8 SECONDS
PRICE: STARTING AT CHF 14,650.-

Let's start by saying that for motorcycle manufacturers, entirely electric vehicles currently make up only a tiny fraction of the market. This sector doesn't (yet) seem ready to conquer the masses, contrary to what happened in the auto industry. Maybe it's waiting for an eco Harley Davidson model, promised for 2020. But there are already well-designed electric motorbikes and scooters that are great to ride. We were able to test ride the BMW C Evolution, a maxi scooter.

From a design perspective, it is aesthetically similar to other BMW C

650 maxi scooters. The unique colours, silver and fluorescent green, are decidedly futuristic. The electric engine and battery are stored in the floor. The C Evolution isn't a lightweight at 275 kg, but it does have a low centre of gravity. It's easy to stay balanced and move the bike when the engine isn't running.

Riding is comfortable, as the seat is well-padded and the handlebars are at the right distance to keep the rider's torso upright and arms relaxed. But the seat height may be problematic for those with shorter legs. And the storage space un-

der the seat is only large enough for one small helmet, not two.

The very powerful engine accelerates quickly after twisting the throttle

We liked the large, easy to read colour screen, the space for a potential passenger and the 12-volt recharging plug at the front of the bike. But riders cannot listen to music on this motorcycle. It's almost a shame, since it runs so quietly. The very powerful engine

accelerates quickly after twisting the throttle on the right handlebar. But its energy is harnessed thanks to a sophisticated electronic regulation system. There are four driving modes that influence the acceleration, electricity consumption and use of the (mock) engine brake.

The advertised range, up to 160 km for the "Long Range" model we tested, is actually only about 120 km on average. Top speed is a bit less than 130 km/h. At that speed, the C Evolution feels very stable, but its small windscreen only partially alleviates air pressure.

Priced at 16,410 Swiss francs for the C "Long Range" (1,760 Swiss francs less for the standard version, which can be used with an A1 licence), this bike isn't for those on a budget. And it wouldn't be ideal for long trips. While it's true that recharging stations have multiplied in recent years, a full recharge takes a long time: close to 4 hours for 80% battery life. Nevertheless, because of the premium and fun aspects of this maxi scooter, 58 were sold in Switzerland last year. In comparison, 32 electric motorbikes from Zero and 11 KTM Freeride E models (see above) were sold in that same year. ▽



KTM FREERIDE E: ALL-TERRAIN

The KTM Freeride E is produced by the global leader in all-terrain motorcycles. The very light vehicle can be used both on- and off-road and is equipped with high-quality brakes and suspensions. There are no gear ratios, which simplifies driving, and it can ride for about 2 hours (or 77 km) at a relaxed pace. The charger is not included on the motorcycle and must be carried separately. Riders must have an A1 licence to ride. It's priced at around CHF 12,000.-



ZERO S: A RECORD RANGE

The Zero models are built by a small specialised brand from California. The models vary based on their range, power (A1 or A licence) and use (road or road/all-terrain). The models can also be used for sport driving. The S model has a record range for an e-bike: up to 350 km for city rides. Starting at CHF 13,590.-

ALTERNATIVES

BOUTIQUE



WHEELBARROW BARBECUE

Created by Ding 3000 – the trio of designers Carsten Schelling, Sven Rudolph and Ralf Webermann – the mobile grill Barrow from German brand Konstantin Slawinski is a cross between a fire pit, a wheelbarrow and a barbecue. With its stainless steel structure and solid oak front wheel, the Barrow is easily portable and can instantly be ready for a barbecue thanks to its detachable grill.

www.konstantinlawinski.com
CHF 954.-



PORTABLE WIND TURBINE

Want to generate your own electricity wherever you are? This is what UK-based Texenergy offers with its portable turbine called Infinite Air. Compact and durable, the 626-g turbine can produce 7.5 to 10 watts from 24 km/h winds. The turbine can also charge any electronic device via the USB port.

www.texenergy.com
CHF 139.-



ON THERMOELECTRIC TIME

Forget batteries: the PowerWatch from California start-up Matrix is a smartwatch charged by the wearer's body heat. On the 1.2 inch black and white screen, the smartwatch measures calorie expenditure, number of steps taken and the amount of thermoelectric energy produced. Waterproof up to 200 m, the latest version – Model X – also vibrates when the wearer receives a notification.

www.powerwatch.com
From CHF 300.-

MAKING CLEANING MORE FUN

With a new motor, streamlined design and optimised emptying system, UK-based Dyson pulled out all the stops to modernise its flagship wireless vacuum model: the Cyclone V10 Absolute. It goes without saying that it also has exemplary vacuuming power, easy manoeuvrability and easy product maintenance.

www.dyson.ch
CHF 749.-



PINEAPPLE TRAINERS

Hugo Boss has designed a collection of environmentally-friendly trainers using Piñatex, a natural material made from pineapple leaf fibres that is 100% vegan. With organic cotton laces and a recycled TPU sole, the German brand's ethical trainers are available in four colours: beige, brown, blue and black.

www.hugoboss.com
CHF 299.-

POCKET CANOE

Designed by Otto Van de Steen and engineer Thomas Weyn, two Belgian entrepreneurs, Onak is a very compact foldable canoe. Inspired by origami boats, this two-seater canoe unfolds in less than five minutes and is stored in a rolling suitcase. Measuring 4.65 metres long and weighing 17 kilos, it can hold two people. Ideal for summer lake adventures.

www.onakcanoes.com
CHF 1,552.-



SMART TENT

The pop-up tent from Cinch unfolds in seconds and has an electrical system powered by solar energy that is strong enough to recharge up to three devices at the same time. The latest version of this nomadic shelter has air-con and smart LED lighting that illuminates the ceiling. It is also modular and can be made larger with the Cinch Pod, a portable device that connects several tents together.

www.cinchpopuptents.com
From CHF 450.-



TRIED AND TESTED

A DRONE MASQUERADING AS A FISH

BY STANISLAS CAVALIER

Chinese manufacturer PowerVision has recently launched an aquatic drone. *Swissquote Magazine* put it to the test.

I would have rather tested this in the turquoise waters of Reunion or the magnificent underwater environment of the Galapagos. But my boss said it wasn't in the budget. So Lake Geneva it was. While less exotic, the lake is still full of treasures that entice divers to swim into the abyss. The Hirondele steamboat, for example, has been 60 feet under since 1862. But there are more than just shipwrecks in Lake Geneva. There are also cars, train carriages and even aeroplanes. And for those who prefer natural wonders, perch, trout, pike and other fish swim peacefully. Off we go to see these treasures!

I tested the PowerRay. Developed by Chinese company PowerVision, this underwater drone has been available in Switzerland since this year at a price of close to 2,000 Swiss francs. The device is packaged in a stylish metal case, which is very useful for easily transporting the 3.8 kg drone. But before heading to the beach and taking it out of the case, download the app on your mobile phone.

After the app is downloaded, the drone quickly connects to a smartphone via WiFi. Once I arrived at the lake, it was very easy to use. Just plug a cable into the drone to connect to the control station that stays on land. The 70-m-long cable is necessary, because it is difficult for radio waves to transmit underwater. It is also useful if you ever have an issue and need to pull the drone out of the lake without going in yourself.

Now that everything is ready, I'm slightly anxious to throw a 2,000-franc drone in the water. What if I haven't set it up properly? One last check and it's off! In the water, the drone floats and rocks on the small waves of the lake. Gently, I press the button on the remote. Nothing happens. I fumble for a few minutes, take the drone out of the water, put it back in, turn it around...nothing. It takes me a good 15 minutes before I realise – thanks to the user guide – that I have to press a button to unlock the drone and start the motors. For safety.

Now that we've solved that tiny problem, we're good to go. The drone floats on the water's surface; I press the remote and it plunges into the depths of the lake, out of view. I can direct the drone via the video feed on my smartphone. Navigating the drone is easy and, surprisingly, the delay on the video is very short.

At first, the PowerRay seemed like a remote-control toy reminiscent of my childhood. I navigate deeper (the drone can go up to 30 metres), go around rocks and through algae looking for fish. The trip is exciting, almost exhilarating. The PowerRay will certainly appeal to divers, fishermen (it can be used to set bait) and even the wealthy public.

But on this May weekend, I don't come across any living things in Lake Geneva. The 4K camera takes very beautiful images and users can take photos and videos, but below depths of 10 metres, the light isn't strong enough in the lake to fully see, even with the light included on the drone. If only we were in the Caribbean... ↵

NICOLAS RIGGHEITTI

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TO BREAK THE RULES,
YOU MUST FIRST MASTER
THEM.

THE VALLÉE DE JOUX. FOR MILLENNIA A HARSH, UNYIELDING ENVIRONMENT; AND SINCE 1875 THE HOME OF AUDEMARS PIGUET, IN THE VILLAGE OF LE BRASSUS. THE EARLY WATCHMAKERS WERE SHAPED HERE, IN AWE OF THE FORCE OF NATURE YET DRIVEN TO MASTER ITS MYSTERIES THROUGH THE COMPLEX MECHANICS OF THEIR CRAFT. STILL TODAY THIS PIONEERING SPIRIT INSPIRES US TO CONSTANTLY CHALLENGE THE CONVENTIONS OF FINE WATCHMAKING.



ROYAL OAK
TOURBILLON
EXTRA-THIN
IN STAINLESS STEEL

AUDEMARS PIGUET

Le Brassus

AUDEMARS PIGUET BOUTIQUES:
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