



FiRE**Si**DE

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Cover

The traveller would tuck away this photograph, and the passing years wrap it in nostalgia. An image of innocence sequestered from the economic meltdowns and senseless violence that inundate the world.

Perhaps a typical souvenir from the hills. But, for the moment, we are grateful to look away from the prevailing gloom and doomsday warnings.

Photo by Sameer Karmarkar

BACK COVER
Images of hope and
accomplishment from
a Municipal school

Comment

“Stories are as necessary
to us as bread. There is no
sense or order to experience
outside of narrative.”

– Robert Stone



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Gearing up for the projects: manufacturing muscle



WHAT'S
NEW ?

Full steam ahead for the biggest project in Thermax history: **Rs.1700 crore order for co-generation boilers**

Thermax's Boiler & Heater Group has begun work on the Rs. 1700 crore order it received in July 2013 for the design, manufacture and commissioning of nine CFBC (circulating fluidized bed combustion) high pressure boilers for a leading petrochemical company.

A project team headed by Rajan Nair, Executive Vice President, is busy with the execution of this prestigious project to be completed within challenging timelines of 25 to 29 months at the client's two plants in Gujarat. Detailed engineering for the co-generation boilers, each of 500 TPH



*Thermax boiler at an
independent power plant
in Andhra: managing
big projects*

has already been drawn up and the company's manufacturing facilities in Gujarat (Savli) and Maharashtra (Chinchwad) have geared up to complete the fabrication, and eventually commission 90000 tons equipment at the sites. The scope of supply also includes air pollution control equipment from Thermax Enviro division.

Bechtel Power Corporation, USA is the consultant for the client.

Thermax had competed against leading international and Indian companies to win this order, the largest from a single client. Its earlier association with the customer and testimonials from other clients helped the company bag the order. Says Rajan, "We have the technology, manufacturing muscle and project management expertise to deliver another world class project within the committed time frame."

The boilers will support the client's expansion plans by generating 730 MW power and 1520 TPH of process steam at the two petrochemical units.

While both units currently use gas based boilers, to gain energy cost advantage the client has decided to use solid fuel for its new requirements. The Thermax boilers to be installed will use solid fuel – a combination of petcoke (refinery waste) and coal (Indian and Indonesian).

The boilers will have the flexibility to handle varying qualities of the fuels with regard to ash content, calorific value and also sulphur content. Thermax will deploy fourth generation CFBC technology to help the client achieve high levels of temperature control and almost negligible down time for maintenance.

Thermax's air pollution control project for SAIL

Thermax's Enviro division is executing an air pollution control project at Steel Authority of India's (SAIL) Rourkela plant in Odisha.

Thermax's scope of work in the Rs.15.58 crore turnkey project includes design, manufacture, supply and installation of 10 electrostatic tar precipitators (ETPs). They will remove tar from the coke oven gas generated in the plant. The project involves dismantling old tar precipitators and installing new ones by modifying existing foundations, pipelines, valves and replacing the electrical system.

Tar removal is important to make use of the high calorific value of coke oven gas. First, the gas has to be cleaned of suspended

particulate matter and condensable tar particulates. The flue gas exiting the oven is cooled and passed through a tar decanter to separate coarser particles, and a precipitator to get rid of tar fines. Thermax will design the ETPs to deliver a stringent emission level of 0.02 gm/m³.

Working in the hazardous environment of a running plant with live steam and coke oven gas lines, the Thermax team has so far completed replacement of eight ETPs and the remaining two are under execution.

These ETPs were designed in partnership with a leading international player in air pollution control equipment.



Removing tar from coke oven gas: stringent emission norms

Commissioning water treatment plants for new and old customers

*Water treatment
at Matix: projects
in India and
South East Asia*



Thermax's Water and Waste Solutions (WWS) has recently commissioned several projects for industries in India and South East Asia.

It completed the first phase of a demineralisation plant (DM) at the Matix Fertilisers and Chemicals Ltd. in Durgapur, West Bengal. The plant currently produces 300 cubic metres of water which is used to generate steam and power as well as produce ammonia and urea. When fully commissioned, this plant will have a capacity of 40,000 cubic metres per day.

The DM plant is part of a larger project that Thermax is executing for Matix. Besides a boiler and heat recovery steam generator for power generation, it includes on the water

side, polishing and side stream filtration. The scope of work includes design, engineering, erection and commissioning of the project.

For Reliance Industries in Hazira, Gujarat, WWS augmented the capacity of an operating water pre treatment plant from 1450 cubic metres to 2675 cubic meters per hour. This turnkey project was a repeat order, following an earlier project in 2006 at Hazira.

In Indonesia, the WWS team successfully commissioned a 100 cubic metres per hour DM plant for PT South Pacific Viscose another old client of Thermax. Besides design and engineering, the Thermax team supervised the construction and commissioning of the unit. The treated water is used for process in this viscose fibre plant.



*Thermax in Indonesia: a repeat job
for PT South Pacific Viscose*

Green Energy to cool multiple locations



Clean energy boiler at Thermax factory and (inset) the team with senior business leaders: viable alternative

Industrial and commercial customers looking to air condition multiple locations from a centralised source will find an energy efficient and viable alternative in the recently set up facility at Thermax's Chinchwad factory. Here, triple effect absorption chillers triggered by heat from a boiler using agrowaste as fuel, pumps chilled water to several buildings in the factory complex. This clean energy facility is based on the district air conditioning concept of a centralised source transmitting hot or cold water through pipe lines to different sites.

The Cooling SBU and the subsidiary Thermax Onsite Energy Services Limited (TOESL) have jointly built the installation. It uses TOESL's energy rental business model of charging per unit of cooling. Thanks to this model, clients need not invest in the boiler and chiller facility, but can have them installed at their site and pay only for chilled or hot water, metered as per use.

The integrated facility offers the cutting-edge efficiency of triple effect chillers that use 35% less steam to generate comparable levels of cooling. The drastic reduction in energy consumption makes the system an attractive option as air conditioning accounts for the major load of any building. The CFC free chiller using water as a refrigerant can work on hot water, steam and exhaust. The boiler supporting the chiller uses the combustor technology for biomass systems that Thermax has adopted from Lambion, Germany.



Triple effect chiller: consumes 35% less steam

The green energy system is ideal for segments like hotels, IT parks and malls requiring large air conditioning loads.



“In the face of short term setbacks, we remind ourselves that we are in the business of energy and environment for the long haul.”



The April to June first quarter of 2013-14 left me with mixed feelings. We had just come out of a tough year during which, though we marginally improved our order backlog, our annual revenue and profits dipped after an impressive phase of growth over the last decade. It was disappointing to be halted in our tracks, to realise that the macroeconomic picture is not going to change in the immediate future and that we have to gear up for another challenging year. While the sluggishness continued into the first quarter, the overall grimness was relieved by the happy news that we were able to conclude the biggest contract so far in the history of Thermax – an order worth Rs. 1700 crore to supply nine high pressure boilers to a petrochemical major.

I thank Unny and our employees for the company's performance in these trying times and for maintaining the profit margins through internal discipline and efficiency improvement programmes. Let me also compliment the team for the tenacity with which it followed the big order and swung it in our favour. I am also thankful to our Directors for their continued guidance and support.

During the year, Unny also received the Asia Innovator Award at the 2012 CNBC Asia Business Leaders Awards in Bangkok. My hearty congratulations to him on this unique honour.

Large swathes of world markets face the prospect of a slow turnaround. In many countries of Europe, debts, austerity measures and rising unemployment add to the climate of uncertainty. Though the US economy is recovering, it is going to be a long-drawn out and slow process. Most emerging economies including BRIC are going through a phase of decelerating growth.

The excess capacity in engineering and capital goods the world over is likely to affect exports from India, as also margins. In the on-going difficulties of the Indian economy, depreciation of the rupee is only the latest; although being a net exporter, this will certainly

help Thermax to be more competitive in overseas markets, increasing inflation from a depreciating currency will pose difficulties for the nation. The near freeze in large investments in infrastructure projects and slow decision making has hit the power sector, the mainstay of the company's growth in recent years. The sector is languishing with very few order finalisations and in the run up to the election year, a change seems unlikely.

At Thermax we have been through business cycles and we do know that bad times cannot go on forever. If I may bring in an analogy from the world of sports, we have never fancied ourselves as sprinters. Rather, we have always adopted the approach of long distance runners and in the face of short term setbacks, we remind ourselves that we are in the business of energy and environment, for the long haul. That said, we need to tighten our belts on all fronts, especially on wasteful and unnecessary expenditure. Essential costs should replace the desirable and we need to eliminate the cost of poor quality.

I am happy to say that we are ready with our growth plans for which we have invested in recent years. The state-of-the-art manufacturing facility being set up by our joint venture (JV) company, Thermax Babcock & Wilcox Energy Solutions is nearing completion. Though we are still awaiting our order for supercritical boilers to be manufactured in this plant, in the medium to long term, I am confident the JV will do well. Our Enviro division's manufacturing unit at Solapur for air pollution control equipment is already operational.

It was to insulate ourselves from the cyclical vagaries of project business that we created the strategic spread of our product businesses; planned to improve the revenue streams from our service businesses and our select international markets. We have to continue to focus on the export market to try and make up for shortfalls in domestic order booking.

I am confident that we are progressing in these areas and that the market for

energy and environment products will improve in the medium term. In spite of today's depressing economic reality, India has the right ingredients – a young and very large population, a growing middle class and sustained consumer spends for a brighter long-term future. When we resume our national resurgence, hopefully sooner than later, I am positive we will be part of its growth story.

Developing our green energy business is indeed part of our long term strategy. Last year, we made good progress by commissioning several renewable energy projects. The Power business won projects on biomass and also on waste gas and heat recovery. Our cooling, solar and RTIC teams came together to successfully execute a technology demonstration project to provide cold storage facilities in rural areas, while generating incidental power. Our solar business has also expanded its range by commissioning a few prestigious photovoltaic projects. We have a number of firsts to celebrate, which is excellent and we need to keep up the good work. But let us replicate these firsts, so that we celebrate our tenth, fiftieth and hundredth units in the market. That's when we will add value to our customer's processes as well as add profits to the organisation.

With the support of all our stakeholders, we are confident of coming through these trying times.



Our Thernax Social Initiative Foundation (TSIF) has successfully completed its 6th year of operation. Through our partnership with the Pune Municipal Corporation and the Akanksha Foundation, we now manage four municipal schools. I am delighted that the first batch of 58 students from one of our schools, the K.C. Thackeray Vidya Niketan appeared for the 10th Standard Board examination – the first ever batch from a PMC English medium school to do so. The school scored a 100% pass, with 42 of the 58 students scoring a First Class and 9 achieving Distinction.

At the function organised to celebrate this unique achievement, it was gratifying to see the children brimming with confidence and the desire to do well in life. My hearty compliments to Shalini Sachdev, the school Principal and her deeply committed team of teachers and staff. They have truly reaffirmed our faith in the founding precept of our Foundation – it is education that will open the doors of opportunity to the vast number of economically underprivileged kids and bridge the deep inequalities that divide our society.

We have also extended our educational initiative to two more schools with the Pimpri Chinchwad Municipal Corporation (PCMC) and are hopeful we will be able to cover more schools in our programme over time.

As a new initiative, TSIF has started an 'in service' training programme for teachers already serving in municipal schools, by recruiting five Teach For India (TFI) alumni as trainers. In our very first year, we have 70 teachers from PMC English medium schools as well as a couple of low income private schools. This is a year-long training program spread over 17 training days at the end of which teachers will be awarded a joint certification by PMC School Board and TSIF. The TSIF team says within just two months of training it is encouraging to note the remarkable difference in the thinking and attitude of the participants.

TSIF has received support and emotional sustenance from some of our employees. With our expanding range of activities, may I request for many more volunteers from our employees and their families, especially to mentor our young students as well as fellows at Teach For India. We need all the youthful idealism and goodwill that we can garner in the service of this educational initiative. By investing our time and care, we will also be bringing more meaning and relevance to our own professional and personal lives.

Meher Pudumjee
Chairperson

EXPRESSIONS

"We have a number of firsts to celebrate. Let's replicate these firsts, so that we celebrate our tenth, fiftieth and hundredth units in the market."



We need to re-orient update technology

Mahesh Nandurkar, SBU Head of Thermax's air pollution control business, Enviro, in a chat with A.M. Roshan, talks about the evolving standards and improving attitudes that influence industrial clean-up.

UP CLOSE

Mahesh's career in Thermax which began in 1988 roughly corresponds to the time when India's industrial pollution control boards had begun the move towards stricter norms. During our conversation at his office in Eco-House, he remembers that in the mid-1980s companies routinely displayed smoking chimneys, and emission control equipment was more of a showpiece to keep the regulators reassured. "Those days equipment such as multi-cyclones were only required to bring down dust particles to a level of 700- 800 mg/Nm³," he says.

Today, Thermax's Enviro division that he heads helps industry meet new regulatory requirements and go beyond them by installing systems that check pollution to within 10 mg/Nm³ limits. As another example, he tells me how the Chattisgarh Government monitors errant emission from the stacks of power, steel and cement plants with the help of opacity metres. "Today the Indian emission norms are steadily moving towards a less than 30 mg/Nm³ benchmark," he says.

Pollution control was not on Mahesh's mind when he completed his mechanical engineering course at the Government Polytechnic, Solapur in 1983. He joined Atlas Copco's shop floor in Pune in an industrial engineering role. Feeling homesick, he soon went back to Solapur and worked with Lakshmi Hydraulics and later with Gujarat Reclaims Rubber Products Limited. Here, he was entrusted with the complete responsibility of a greenfield project. Working at the construction site with the mandate to get things done, he learned how to deal with people and deadlines. That was the first time Mahesh had "an inkling that I was meant for a project management role."

Even as he grew in his job, there was the growing restlessness, the need to do something more taxing, something new. By then, he realised that for better opportunities, he had to leave the comfort of his home town. In 1987, he joined Indian Seamless at Ahmednagar, where he gained experience in installing seamless tube mills. When the company needed Thermopacs (thermal oil heaters) he got in touch with Thermax to procure them. That association

soon led to a job interview with Prakash Kulkarni who was heading Enviro at that time. During the session, Mahesh was asked about the Chalk Kerosene Test, a standard procedure to check weld defects. "I didn't have a clue and told him so. Prakash remarked, 'You at least know what you don't know,' and took me in."

Mahesh joined as site engineer at a time when Thermax's air pollution control business, manufacturing multi clones and small bag filters had revenues of just Rs. 3 crore. The next four years would see him travel extensively as the division's customer base spread. From 1992 to '97, Mahesh would work as a Project Manager and also handle a business process re-engineering project. In 1998 he moved into sales to spearhead the sale of electrostatic precipitators (ESPs) that would eventually become the main revenue earner of the division.

In 2000, Mahesh again felt restless. He joined Philips Medical Systems – a total change from the dusty context of air pollution control run by engineers to the clean electronic environment of diagnosticians and surgeons, operating in multiple countries across time zones. He was the Project Manager for South East Asia. While he was at this new role, Thermax, assisted by a consulting firm went through a turnaround phase. The company went against the advice of the consultant to shut down the air pollution control business. "Enviro business survived thanks to the conviction of V.J. Shah, our business head at that time and due to Meher Pudumjee's faith that we could revive it."

For Enviro, given another lease of life, it was a time to call back some of its stalwarts. Seeing the wisdom in Shah's suggestion, Mahesh rejoined Thermax in 2003 as Head of Projects. The next eight years were growth years for Enviro, benefiting from the infrastructure boom in the country. Mahesh gained experience in the sourcing and manufacturing functions. In 2008, he became the Operations Chief and in 2011 took over as the SBU Head of Enviro division.

attitudes even as we and product quality

In the last 10 years, Enviro has grown to be one of the project biggies of the company. Though the division is currently negotiating a rough patch, Mahesh is confident of seeing economic activity back on track. "There are signs of recovery in the cement sector and power has to resume its growth push, sooner than later."

Staying calm certainly helps in difficult times. What helps Mahesh unwind? He has a big collection of Hindi films – about 800 of them. "I can relax any time with a film like *Chupke Chupke* or *Iqbal*." Old Hindi film songs are another passion, especially those penned by Gulzar. His wife Sangita and daughter Janvi share his interests.

Thermax is tapping the overseas markets to expand its air pollution control business. Besides the successful projects it did in Egypt and the Middle East, in recent years, Enviro has also focused on South East Asia and North Africa. This year, Latin America is the chosen market.

Besides ESPs, in recent years, retrofit of aging equipment has also emerged as an important revenue earner. "For clients, retrofits cost only about 1/3rd the investment in new systems, and in operating units there is the bigger benefit of less downtime." Mahesh says the industry is moving towards bag filters as "any emission levels less than 20 mg/Nm³ calls for solutions beyond ESPs." Enviro's new facility at Solapur can manufacture bag filters as well as ESPs. "We have the space to expand and it is planned to cater to future business needs."

As we return to the state of today's pollution control business, Mahesh explains that while it was and continues to be regulation driven, there is also a welcome change in industry attitude. He points out that while the Central Pollution Control Board's norm for suspended particulate matter is 100 mg/Nm³ Tata Steel has gone in for under 30 mg/Nm³ for its pollution control equipment. "Such companies plan ahead for times when regulations are going to be more stringent." Increasingly, companies are also aware of the many benefits from pollution control – increase in uptime, better health and productivity of employees, better performance of control

systems in dust-free environment, and better reputations. "For some, it also means product recovery and gains on the balance sheet," he explains with the examples of cement plants and coal injection units in steel plants.

What makes a real difference in today's fast changing environment, Mahesh feels, is the need to reorient attitudes even as we update technologies and product quality. As everything, from learning cycles and execution schedules to retrofit time frames, speeds up, "we are literally asked to run on the escalator." Speed comes from a changed mindset, willingness and a preparedness to rev up. Training young recruits is one of his focus areas and helping him in this critical task is the division's learning portal. The portal has clearly laid out methodologies and helps new employees with learning outcomes.

Pollution control business is all set for a booming decade ahead and Mahesh says it is one area where young people can combine their learning and growth aspirations. "If we keep alive our dreams and work passionately, dreams do become reality," he says earnestly as we wrap up our conversation.



We have the space to expand.

Ascending the value chain

With an eye on increasing exports and improving customer relationships, Thermax organised a conference with its business associates and international regional managers in Pune. Held on 14th and 15th May, participants from Japan, Korea, Egypt, Saudi Arabia, Kuwait, Oman, Spain, Italy, Israel, Portugal, the UAE and Bangladesh attended the meet.

This conference organised by the Boiler and Heater division is an outcome of the globalisation strategy of Project Ascent – a project to streamline processes and crank up international business. The business

associates presented information on the market situation in their respective countries and learnings from executed projects. The participants brainstormed around a strategic business plan to increase exports and revenue.

Speaking at the event, Unny and B&H's senior management shared their vision of Thermax extending its reach in global markets.



ROUND UP

*Thermax's Purven
Vyas with Hamlin's
Alfredo Soon and Ruel
Valloso of Unimex :
quick return on client
investment*



When Hamlin Industrial Corporation in the Philippines was looking for a boiler along with emission control and water treatment systems for their textile plant, Thermax was chosen over Chinese and Filipino competition because of its ability to 'cross sell' and provide an integrated utility solution. Thermax was also rated technically superior because its equipment consumes lesser energy, saves fuel and lowers operating costs, returning the client's investment in 7-8 months.

The scope of supply includes a boiler, trema cyclone, bag-filter and reverse osmosis (RO) plant. The Huskpac boiler has the option to burn biomass as well as coal.

Integrated utility solution for a Filipino textile company

An air preheater increases efficiency while directly saving fuel. The trema cyclone and bag filter together reduce suspended particulate matter to less than 150 mg/Nm³, to meet Philippines' emission norms. The RO system removes all major dissolved solids in the water, reducing boiler blowdown (water intentionally wasted from a boiler to avoid concentration of impurities during steam evaporation). Hence energy is better conserved too.

Ruel Valloso from Unimex, Thermax's dealer facilitated this cross sale, a first for the company in South East Asia. It will help strengthen the Thermax brand as an integrated solution provider with a strong technology base.

Solar based cooling project for Honeywell



The facility at Hyderabad : efficient and eco-friendly energy

Thermax recently commissioned the first commercial solar based cooling project at Honeywell Technologies Automation Lab in Hyderabad. This follows the technology demonstration project at the Ministry of New and Renewable Energy.

Commissioned in June by the Solar and Cooling teams, 128 parabolic trough collectors are integrated with a double effect hot water fired chiller of 100 TR capacity. The solar based cooling system meshes well with the two existing conventional chillers of

120 TR capacity. Over the course of a year, the output of this system is expected to be more than 1 lakh TR hours.

The integration scheme, designed and developed by Thermax in consultation with Honeywell, was inaugurated by Mikkilineni Krishna, Honeywell group's Sr Vice President, Engineering and Operations.

Thermax also commissioned a roof top solar installation for lighting at Unilever's industrial facility at Khangaon, Maharashtra



Technochem's conference room : An array of products

New channel showroom in UP

Channel partner Nikhil Technochem's relationship with Thermax goes back a long way.

As a fuel efficiency consultant in 1983, Ranjan Kulshreshta gave Thermax a tough time on technical and design issues when customers in Kanpur sought his advice on buying boilers. A meeting with R.D. Aga in 1986 led him to become one of Thermax's first dealers in India. His brother Sanjay joined him, converting their house into an

office and using their scooter to despatch chemicals to customers.

26 years on, in March 2013, Nikhil Technochem inaugurated Thermax's first channel showroom in Uttar Pradesh for heating, WWS, air pollution control, chemicals and services products. D. Bhanja (CRM-North) and Sanjay Kulkarni of CMG inaugurated the office's new conference hall with video conferencing facility, walk-in product outlet and samples display.



Dr. R.R. Sonde accepting the award : harnessing India's intellectual capital

Thermax was recently honoured with the National Intellectual Property Award for 2013 in the category of Trademarks at a ceremony in New Delhi. Instituted by the Confederation of Indian Industry in partnership with the Government of India's Department of Industrial Policy and Promotion, and Intellectual Property Office, the awards were presented on World Intellectual Property Day, 26th

Thermax wins National Intellectual Property Award 2013

April 2013. Dr. R.R. Sonde, head of Research, Technology and Innovation accepted the award on behalf of Thermax.

The national awards which comprise Rs. 1 lakh in cash and a citation recognise industry, institutions and individuals who have harnessed India's intellectual capital and have nurtured an eco system for creativity and innovation.

Value engineering suggestions for Saudi Aramco

Saudi Aramco invited Thermax among six other European companies to participate in a four-day discussion on standard value engineering for heat recovery steam generators (HRSG). Siemens, Foster Wheeler, Macchi, Nem and Cerrey were the other companies who participated in the meet in Al-Khobar, Saudi Arabia.

It was the first time Aramco invited reputed vendors to recommend technical revisions in their standards. Aramco appreciated N.G. Devdas who represents B&H in Saudi Arabia for his participation and suggestions.

Aramco, the national oil and natural gas company in Saudi Arabia which supplies



Devdas (right) with the certificate : relevant contribution

22% of the world's crude, has stringent engineering standards. The B&H plants in Chinchwad and Savli had to go through rigorous audits of design & engineering, manufacturing quality control, and HSE standards before qualifying to become Aramco's preferred vendor.

Since 2009, a Thermax chiller and two centrifugal chillers air condition the control room at Aramco's facility in Abqaiq. In 2010, Thermax supplied a modularised waste heat recovery boiler to SAMREF (Saudi Aramco and Exxon Mobil JV) refinery at Yanbu. Thermax is currently working on five more projects for Aramco.

Quick calculations : arithmetic prowess



A day for math whizzes

The Abacus Annual day in February saw enthusiastic participation from students as well as their parents.

Organised by Industrial Relations, students who underwent this calculation course - completed all eight levels of the Abacus, and Vedic Math course - were felicitated. The whizkids then demonstrated their arithmetic

prowess by solving 80 to 95 sums out of 100 in 10 minutes.

But these kids weren't just geeks. They enthusiastically took to the stage to sing, dance and enact skits, much to the cheer of everyone present. Dancing classes, anyone? Watch this space.

Partnering to boost business in Malaysia

Thermax's Boiler & Heater Services group signed a Memorandum of Understanding (MoU) with Kerujuteeran QKS Sdn. Bhd (KQKS), Kuala Lumpur, to develop its business in Malaysia. Signed by Azlan Bin Rastam, the MD of KQKS and Srinivas Rao, Head of B&H Service, the MOU establishes a strategic alliance to create a robust supply chain for a range of services and products.

B&H Services has a decade long track record of successfully completing rejuvenation projects for Petronas in Malaysia. Thermax is keen to develop sustainable support for a range of - plant improvement projects,



*Srinivas Rao and
Azlan Rastam:
developing
sustainable service
solutions*

replacement-in-kind, and built-to-print (an outsourcing service specialising in customer-designed products). Says Srinivas Rao, "We are happy we could join hands with KQKS, a strong and reliable partner and an established company in Malaysia for our service support to Petronas and other clients." With a presence in the oil & gas and other industrial sectors, KQKS has a proven track record of project management, fabrication and procurement. Its outsourcing and localisation capability is supported by requisite quality certifications and a clean record on Health, Safety & Environment.

Knowledge seminars for customers



Training session in progress : sharing information

In 2010, Thermax had supplied a RO plant plus products and systems for water and sewage treatment to Delhi Metro Rail Corporation (DMRC). Recently with TCA Garv Marketing, Thermax conducted a seminar in Delhi on reverse osmosis and cooling water chemicals for DMRC's existing plants and new projects. Conducted by Ravindra Shelke from Thermax and Rakesh Sethi from Garv, they shared information

about Thermax products and differentiated them from local players.

Elsewhere at Haldiram's facility in Nagpur, Ajay Dabhlade and Prafull Pochhi from Thermax trained operators of utility equipment on water treatment chemicals and equipment.

Workshop on gasification for India



Full house at the workshop : swapping ideas

A workshop on 'Gasification Technology for India' organised by Thermax and I&T in Pune helped scientific researchers and industrial experts swap ideas and experiences in this area. The event helped create a network to assemble information, discuss developments and government policies related to the technology.

Gasification uses limited oxygen to convert feedstock (like coal) into a synthetic gas. Unlike combustion which uses abundant oxygen, gasification uses a tiny amount, which is combined with steam and cooked under pressure. The resulting synthetic gas

can be burned directly or used for fertilizers, pure hydrogen, liquid fuels, industrial heating and power generation.

At the event, a consortium formed by DRDO, Thermax, I&T, IOC and CII was also formally launched. The consortium plans to develop appropriate solutions, after evaluating the country's fuel scenario and existing gasification technologies

Representatives from Reliance Industries, Jadavpur University, The Indian Institute of Science, Central Institute of Mining & Fuel Research, and The Energy and Resources Institute attended the workshop.

*Enviro team at bridge building :
Beyond expectations*



Technology Day: Celebrating ideation, knowledge and innovation

Technology Day was celebrated for the fifth consecutive year at Thermax on 11th May 2013. The event was preceded by an impressive line up of competitions like online quiz, extempore speaking, group discussion and movie making. These tested participants' ideation, imagination, knowledge and common sense.

One of the contests, Blackjack saw teams vying to design and construct a bridge with nothing but popsicle sticks, adhesive and thread. Going beyond the jury's expectations of an outer limit of 12 kg, the winning structure from Enviro bore a 22 kg load.

Dr. Anil Kakodkar, former Chairman of the Atomic Energy Commission of India, the chief guest at Technology Day celebrations, gave away the prizes including the Dr. N. D. Joshi Innovation Award. The award which carries a cash prize of Rs. One lakh was bagged by Ravindra Paygude, Shailendra Kumar, Ganesh Bari, Vinod Basalalli and Sourabh Kokitkar for 'Best absorption of fuel cell technology from DRDO and creating new business for Thermax'. Innovators across the company were also felicitated for their work.

Showcasing Thermax at trade fairs

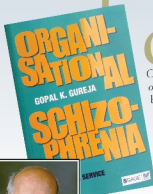


Visitors at the Shanghai exhibition : efficient chillers

Thermax displayed its efficient triple effect chiller at the China Refrigeration exhibition in Shanghai, and its new steam fired chiller at the ASHRAE show in the US. At the ICCI Conference and Exhibition in Istanbul Ashish Vaishnav made a presentation on Thermax's cooling systems and applications.

At the Sugar Asia exhibition in Bangkok, Thermax presented its sugar chemicals and ion exchange resins for the sugar, ethanol, distillery and energy sectors. And in Johannesburg, the company participated in the Power & Electricity World Africa summit.

Thermax veteran Gopal Gureja's book on customer service



Gopal K. Gureja, Thermax's former service chief has released his second book, *Organisational Schizophrenia – Impact on Customer Service Quality*. In the book, the author laments how the gap between intent and execution, policy and practice – which he calls organisational schizophrenia – is harming employee well-being, providing shoddy customer service and propagating a culture of dishonesty and lack of integrity.

The book is a testimony to 80 year old Gureja's continuing concern for customer care. To tweak an old axiom, 'you can take the man out of customer service but you can't take customer service out of the man.'

Gureja has been closely associated with customer-service throughout his corporate career. At Wanson India (now, Thermax Ltd.) in 1970, he joined as service manager and retired in 1996 as director of a business

division and member of the Total Quality Steering Panel.

Gureja published his first book in 1997 (Iata McGraw-Hill) – *Creating Customer Value* – on the strategic importance of after-sales-service and the changing role of the service manager. He has written on various aspects of customer service for the Economic Times and other publications. He has also helped finalise the syllabus for Relationship Marketing for management studies at Symbiosis, where he also taught the subject.

In 2007, Gureja was engaged in empirical research to explore reasons for dissonance between customer care policy and practice even in well-meaning companies. The findings of this comprehensive research were translated into this book published by Sage (2013). The book has been reviewed and excerpted in national publications including Mint, Business Standard and the Indian Express. It is available in bookstores and on <http://www.customercaresbooks.com>

Recognising
Thermax's
harmonious
industrial
relations



*The Thermax team with the trophy:
employee friendly policies*

Thermax's Industrial Relations team won the Best Human Response Award in the large scale industry category. The award, instituted by the Maharashtra Chamber of Commerce, Industries and Agriculture (MCCIA), Pune and Rotary Club of Poona West, acknowledges the

company's harmonious industrial relations, employee-friendly policies and initiatives.

The Thermax team comprising Keshav Gholve, Suhas Ghatwai and Mohan Patil received the trophy and award from Ravi Chopra, MD of Piaggio Vehicles Pvt. Ltd.

Mayor Mohini Lande inaugurates one of the PCMC schools to be adopted by Thermax, in the presence of Dr. Shrikar Pardeshi, Municipal Commissioner, Anu Aga and Corporators; creating an education model of excellent standards.



Thermax Foundation to manage two PCMC Schools

Thermax Social Initiative Foundation (TSIF) has extended its educational initiatives to two schools of the Pimpri Chinchwad Municipal Corporation (PCMC): Chhatrapati Shahuji Maharaj English Medium School in Kasarwadi and Srimati Anusayabai Namdeo Waghare English Medium School in Pimpri.

The inaugural event was held at the Kasarwadi School on 17th July, 2013 in the presence Dr. Shrikar Pardeshi, PCMC Commissioner; Mohini Lande, Mayor; Corporators, Anu Aga, Meher Padumjee, the students and their parents. Dr. Pardeshi appreciated the genuine efforts to bring quality education to the masses and assured his support for these and similar initiatives.

The schools which begin with Lower KG will add a new class each academic year.

TSIF's adoption of these schools follows its earlier successful partnership with the Pune Municipal Corporation (PMC) to improve the quality of education in municipal schools. It is managing four PMC schools. With PCMC too TSIF has signed an MOU where the Municipality would support children with books, uniforms, mid-day meals and bus passes. TSIF and its partner Akanksha would look after the overall development of children, recruit and train teachers, pay their salaries.

Says Anu, "We are learning from these creative experiments. We hope we can create an education model of excellent standards which could be easily replicated by municipalities through similar joint initiatives."



The Service SBU of Cooling & Heating is bringing back the power of customer testimonials to help the efforts of sales teams.

Shailesh Teli, service manager and his team with the help of channel partners collected 50 reference letters from various Thermax customers in the western region. These

references, testimony to the good work done by Thermax teams have been handed over to sales teams of Heating and Channel Management.

What better way than to remind everyone once again about the recurring gains from jobs done well?



Many feathers in Samruddhi's cap

At the interschool competitions held for Rosary schools in 2012- 13, ten year old Samruddhi won the first prize in English and Hindi handwriting, second prize in spell bee and drawing competitions. She received the prizes at the annual day programme held at Ganesh Kala Krida Rangmanch, Pune.

A fourth standard student at the Rosary International School, Bibvewadi, Samruddhi is the daughter of Jayashri and Pandurang Deokar from B&IT division. She loves swimming and practises martial arts.

Jiya plays for the national champion team

Ten year old Jiya is a member of the Maharashtra Girl's team for roll ball, which won all its five matches and emerged national champions in 2013. Earlier, she had been selected for the team from the Pune District roll ball team.

Jiya is also a star speed skater. Recently she and her team members created a record for the Indian and Asia Book of records by relay roller skating nonstop for 51 hours in Belgaum. Jiya, a 4th standard student at Smt. S.S. Ajmera School, Pimpri, is the daughter of Naaz and Fakruddin Mujawar from Heating. She loves painting and dancing.



Michael is a Gold Medallist



Michael Raj won a Gold Medal and a certificate for the best all rounder in the Electrical and Electronics Engineering stream for 2011-12, by Virudhunagar S.Vellaichamy Nadar Polytechnic College, Tamil Nadu. He was felicitated during the annual college day function.

Michael joined Thermax as a Diploma Engineering Trainee in July 2012 and works with heating projects in Mumbai. He loves music and playing chess.

Kudos for Anil Pange's fire fighting expertise

Anil Pange won the appreciation of the Health, Safety and Environment department for his thorough fire fighting demonstration. Anil, a Fire Security Guard at the Chinchwad factory, had conducted the demo before the MIDC Fire department.



School topper, Reena

Reena, a 12th standard student with 98.5% marks was the topper at Union Christian School, Chennai. She scored 200/200 in mathematics, computers and chemistry and 198/200 in physics. She stood 71st on the rank list of Tamil Nadu.

Reena, daughter of Jessy and Babu Thomas from B&H division, likes to read and watch movies. She is all set to study Electronics and Communications at the College of Engineering Guindy, Anna University.



Preeti, an outstanding performer



Preeti has won the outstanding performance award in 2012-13 in her school, PES Modern High School, Pune for her all-round performance in the 10th standard. She also scored 94% marks in the board exams.

Preeti who likes to draw and read in her free time is the daughter of Pratibha and Prakash Shedge from WWS Finance.

Anish passes Engineering exam with distinction

Anish completed his B. Tech. in Instrumentation & Control with distinction from the College of Engineering, Pune. Son of Kshitija and Kiran Thuse from Thermax Engineering Construction Company, Anish is currently working with Black & Veatch.

Keenly interested in Indian classical music, Anish plays the harmonium and sitar. He has been an active member of the SPIC MACAY – Society for the Promotion of Indian Classical Music And Culture Amongst Youth.



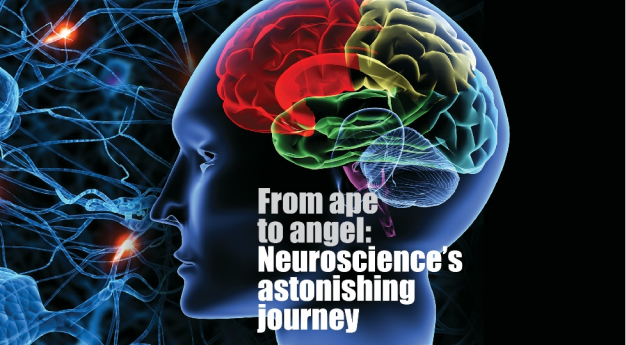
Dr. Alpana bags best innovation award in teaching



Dr. Alpana Vaidya won the best innovator award in teaching at the Pune University. She was among the two teachers selected for their innovative methods in teaching through competitions held at various colleges. Alpana, an Associate Professor and HOD of Psychology in the Symbiosis College of Arts and Commerce, Pune received the Award from Dr. Raghunath Mashelkar.

Last year, she had been invited for a talk at an international conference at Korea's Inha University. Alpana is the wife of Ashutosh Vaidya from B&H finance.

LIMELIGHT



From ape to angel: Neuroscience's astonishing journey

V.S. Ramachandran, renowned neuroscientist, shares the exciting insights into the marvels of the human brain, and the strands that connect brain, mind and body. Excerpts from The Tell-Tale Brain, Unlocking the Mystery of Human Nature, his 2010 book.

SIGNPOSTS

For the past quarter century I have had the marvelous privilege of being able to work in the emerging field of cognitive neuroscience. This book is a distillation of a large chunk of my life's work, which has been to unravel – strand by elusive strand – the mysterious connections between brain, mind, and body. In the chapters ahead I recount my investigations of various aspects of our inner mental life that we are naturally curious about. How do we perceive the world? What is the so-called mind-body connection? What determines your sexual identity? What is consciousness? What goes wrong in autism? How can we account for all of those mysterious faculties that are so quintessentially human, such as art, language, metaphor, creativity, self-awareness, and even religious sensibilities? As a scientist I am driven by an intense curiosity to learn how the brain of an ape – an ape! – managed to evolve such a godlike array of mental abilities.

My approach to these questions has been to study patients with damage or genetic quirks in different parts of their brains that produce

bizarre effects on their minds or behavior. Over the years I have worked with hundreds of patients afflicted (though some feel they are blessed) with a great diversity of unusual and curious neurological disorders. For example, people who "see" musical tones or "taste" the textures of everything they touch, or the patient who experiences himself leaving his body and viewing it from above near the ceiling. In this book I describe what I have learned from these cases. Disorders like these are always baffling at first, but thanks to the magic of the scientific method we can render them comprehensible by doing the right experiments. In recounting each case I will take you through the same step-by-step reasoning, occasionally navigating the gaps with wild intuitive hunches – that I went through in my own mind as I puzzled over how to render it explicable. Often when a clinical mystery is solved, the explanation reveals something new about how the normal, healthy brain works, and yields unexpected insights into some of our most cherished mental faculties...Brain science has advanced at an astonishing pace over the past fifteen

years, lending fresh perspectives on—well, just about everything. After decades of floundering in the shadow of the “hard” sciences, the age of neuroscience has truly dawned, and this rapid progress has directed and enriched my own work.

The past two hundred years saw breathtaking progress in many areas of science. In physics, just when the late nineteenth-century intelligentsia were declaring that physical theory was all but complete, Einstein showed us that space and time were infinitely stranger than anything formerly dreamed of in our philosophy, and Heisenberg pointed out that at the subatomic level even our most basic notions of cause and effect break down. As soon as we moved past our dismay, we were rewarded by the revelation of black holes, quantum entanglement, and a hundred other mysteries that will keep stoking our sense of wonder for centuries to come... Cosmology gave us the expanding universe, dark matter, and jaw-dropping vistas of endless billions of galaxies. Chemistry explained the world using the periodic table of the elements and gave us plastics and a cornucopia of wonder drugs. Mathematics gave us computers—although many “pure” mathematicians would rather not see their discipline sullied by such practical uses. In biology, the anatomy and physiology of the body were worked out in exquisite detail, and the mechanisms that drive evolution finally started to become clear. Diseases that had literally plagued humankind since the dawn of history were at last understood for what they really were (as opposed to, say, acts of witchcraft or divine retribution). Revolutions occurred in surgery, pharmacology, and public health, and human life spans in the developed world doubled in the space of just four or five generations. The ultimate revolution was the deciphering of the genetic code in the 1950s, which marks the birth of modern biology.

By comparison, the sciences of the mind—psychiatry, neurology, psychology—languished for centuries. Indeed, until the last quarter of the twentieth century, rigorous theories of perception, emotion, cognition, and intelligence were nowhere to be found (one notable exception being color vision). For

most of the twentieth century, all we had to offer in the way of explaining human behavior was two theoretical edifices—Freudianism and behaviorism—both of which would be dramatically eclipsed in the 1980s and 1990s, when neuroscience finally managed to advance beyond the Bronze Age. In historical terms that isn't a very long time. Compared with physics and chemistry, neuroscience is still a young upstart. But progress is progress, and what a period of progress it has been! From genes to cells to circuits to cognition, the depth and breadth of today's neuroscience—however far short of an eventual Grand Unified Theory it may be—is light-years beyond where it was when I started working in the field. In the last decade we have even seen neuroscience becoming self-confident enough to start offering ideas to disciplines that have traditionally been claimed by the humanities...

As heady as our progress has been, we need to stay completely honest with ourselves and acknowledge that we have only discovered a tiny fraction of what there is to know about the human brain. But the modest amount that we have discovered makes for a story more exciting than any Sherlock Holmes novel. The adage that fact is stranger than fiction seems to be especially true for the workings of the brain. In this book I hope I can convey at least some of the wonder and awe that my colleagues and I have felt over the years as we have patiently peeled back the layers of the mind-brain mystery. Hopefully it will kindle your interest in what the pioneering neurosurgeon Wilder Penfield called “the organ of destiny” and Woody Allen, in a less reverential mood, referred to as man's “second favorite organ.”

**Is it true
that most of us
“use only
10 percent
of our brain”?
Is there a Picasso,
a Mozart, and
a Srinivasa
Ramanujan in
all of us,
waiting to be
liberated?**



Is man an ape or an angel (As Benjamin Disraeli asked in a famous debate about Darwin's theory of evolution)? Are we merely chimps with a software upgrade? Or

are we in some true sense special, a species that transcends the mindless fluxions of chemistry and instinct? Many scientists, beginning with Darwin himself, have argued the former: that human mental abilities are merely elaborations of faculties that are ultimately of the same kind we see in other apes. This was a radical and controversial proposal in the nineteenth century – some people are still not over it – but ever since Darwin published his world-shattering treatise on the theory of evolution, the case for man's primate origins has been bolstered a thousandfold. Today it is impossible to seriously refute this point: We are anatomically, neurologically, genetically, physiologically apes. Anyone who has ever been struck by the uncanny near-humanness of the great apes at the zoo has felt the truth of this.

At that key point, incremental changes stopped having incremental effects, and precipitated a sudden qualitative change called a phase transition.

I find it odd how some people are so ardently drawn to either-or dichotomies. "Are apes self-aware or are they automata?" "Is life meaningful or is it meaningless?" "Are humans 'just' animals or are we exalted?" As a scientist I am perfectly comfortable with settling on categorical conclusions—when it makes sense. But with many of these supposedly urgent metaphysical dilemmas, I must admit I don't see

the conflict. For instance, why can't we be a branch of the animal kingdom and a wholly unique and gloriously novel phenomenon in the universe?

I also find it odd how people so often slip words like "merely" and "nothing but" into statements about our origins. Humans are apes. So too we are mammals. We are vertebrates. We are pulpy, throbbing colonies of tens of trillions of cells. We are all of these things, but we are not "merely" these things. And we are, in addition to all these things, something unique, something unprecedented, something transcendent. We are something truly new under the sun, with uncharted and perhaps limitless potential. We are the first and only species whose fate

has rested in its own hands, and not just in the hands of chemistry and instinct. On the great Darwinian stage we call Earth, I would argue there has not been an upheaval as big as us since the origin of life itself. When I think about what we are and what we may yet achieve, I can't see any place for snide little "merelies."

Any ape can reach for a banana, but only humans can reach for the stars. Apes live, contend, breed, and die in forests – end of story. Humans write, investigate, create, and quest. We splice genes, split atoms, launch rockets. We peer upward into the heart of the Big Bang and delve deeply into the digits of pi. Perhaps most remarkably of all, we gaze inward, piecing together the puzzle of our own unique and marvelous brain. It makes the mind reel. How can a three-pound mass of jelly that you can hold in your palm imagine angels, contemplate the meaning of infinity, and even question its own place in the cosmos? Especially awe inspiring is the fact that any single brain, including yours, is made up of atoms that were forged in the hearts of countless, far-flung stars billions of years ago. These particles drifted for eons and light-years until gravity and chance brought them together here, now. These atoms now form a conglomerate – your brain – that can not only ponder the very stars that gave it birth but can also think about its own ability to think and wonder about its own ability to wonder. With the arrival of humans, it has been said, the universe has suddenly become conscious of itself. This, truly, is the greatest mystery of all.

It is difficult to talk about the brain without waxing lyrical. But how does one go about actually studying it? There are many methods, ranging from single-neuron studies to high-tech brain scanning to cross-species comparison. The methods I favor are unapologetically old-school. I generally see patients who have suffered brain lesions due to stroke, tumor, or head injury and as a result are experiencing disturbances in their perception and consciousness. I also sometimes meet people who do not appear brain damaged or impaired, yet report having wildly unusual perceptual or mental experiences. In either case, the procedure is the same: I interview them, observe their behavior, administer some simple tests, take

a peek at their brains (when possible), and then come up with a hypothesis that bridges psychology and neurology—in other words, a hypothesis that connects strange behavior to what has gone wrong in the intricate wiring of the brain. A decent percentage of the time I am successful. And so, patient by patient, case by case, I gain a stream of fresh insights into how the human mind and brain work—and how they are inextricably linked. On the coattails of such discoveries I often get evolutionary insights as well, which bring us that much closer to understanding what makes our species unique.

Consider the following examples:

- Whenever Susan looks at numbers, she sees each digit tinged with its own inherent hue. For example, 5 is red, 3 is blue. This condition, called synesthesia, is eight times more common in artists, poets, and novelists than in the general population, suggesting that it may be linked to creativity in some mysterious way. Could synesthesia be a neuropsychological fossil of sorts – a clue to understanding the evolutionary origins and nature of human creativity in general?
- Humphrey has a phantom arm following an amputation. Phantom limbs are a common experience for amputees, but we noticed something unusual in Humphrey. Imagine his amazement when he merely watches me stroke and tap a student volunteer's arm – and actually feels these tactile sensations in his phantom. When he watches the student fondle an ice cube, he feels the cold in his phantom fingers. When he watches her massage her own hand, he feels a "phantom massage" that relieves the painful cramp in his phantom hand. Where do his body, his phantom body, and a stranger's body meld in his mind? What or where is his real sense of self?
- A patient named Smith is undergoing neurosurgery at the University of Toronto. He is fully awake and conscious. His scalp has been perfused with a local anesthetic and his skull has been opened. The surgeon places an electrode in Smith's anterior cingulate, a region near the front of the brain where many of the neurons respond to pain. And sure enough, the doctor is able to find a neuron that becomes active whenever Smith's hand is poked with a needle. But the surgeon is astonished by what he sees next. The same neuron fires just as vigorously when Smith merely watches another patient being poked. It is as if the neuron (or the functional circuit of which it is a part) is empathizing with another person. A stranger's pain becomes Smith's pain, almost literally. Indian and Buddhist mystics assert that there is no essential difference between self and other, and that true enlightenment comes from the compassion that dissolves this barrier. I used to think this was just well-intentioned mumbo-jumbo, but here is a neuron that doesn't know the difference between self and other. Are our brains uniquely hardwired for empathy and compassion?
- When Jonathan is asked to imagine numbers he always sees each number in a particular spatial location in front of him. All numbers from 1 to 60 are laid out sequentially on a virtual number line that is elaborately twisted in three-dimensional space, even doubling back on itself. Jonathan even claims that this twisted line helps him perform arithmetic. (Interestingly, Einstein often claimed to see numbers spatially.) What do cases like Jonathan's tell us about our unique facility with numbers? Most of us have a vague tendency to image numbers from left to right, but why is Jonathan's warped and twisted? As we shall see, this a striking example of a neurological anomaly that makes no sense whatsoever except in evolutionary terms.
- A patient in San Francisco becomes progressively demented, yet starts creating paintings that are hauntingly beautiful. Has his brain damage somehow unleashed a hidden talent? A world away, in Australia, a typical undergraduate volunteer named John is participating in an unusual experiment. He sits down in a chair and is fitted with a helmet that delivers magnetic pulses

From ape to angel: Neuroscience's astonishing journey



**As a scientist
I am driven
by an intense
curiosity to learn
how the brain
of an ape—an ape!
—managed to evolve
such a godlike
array of mental
abilities.**

to his brain. Some of his head muscles twitch involuntarily from the induced current. More amazingly, John starts producing lovely drawings—something he claims he couldn't do before. Where are these inner artists emerging from? Is it true that most of us "use only 10 percent of our brain"? Is there a Picasso, a Mozart, and a Srinivasa Ramanujan in all of us, waiting to be liberated? Has evolution suppressed our inner geniuses for a reason?

- Until his stroke, Dr. Jackson was a prominent physician in Chula Vista, California. Afterward he is left partially paralyzed on his right side, but fortunately only a small part of his cortex, the brain's seat of higher intelligence, has been damaged. His higher mental functions are largely intact: He can understand most of what is said to him and he can hold up a conversation reasonably well. In the course of probing his mind with various simple tasks and questions, the big surprise comes when we ask him to explain a proverb, "All that glitters is not gold." "It means just because something is shiny and yellow doesn't mean it's gold, Doctor. It could be copper or some alloy."

"Yes," I say, "but is there a deeper meaning beyond that?"
"Yes," he replies, "it means you have to be very careful when you go to buy jewelry; they often rip you off. One could measure the metal's specific gravity, I suppose."
Dr. Jackson has a disorder that I call "metaphor blindness." Does it follow from this that the human brain has evolved a dedicated "metaphor center"?

- Jason is a patient at a rehabilitation center in San Diego. He has been in a semicomatose state called akinetic mutism for several months before he is seen by my colleague Dr. Subramaniam Sriram. Jason is bedridden, unable

to walk, recognize, or interact with people—not even his parents—even though he is fully alert and often follows people around with his eyes. Yet if his father goes next door and phones him, Jason instantly becomes fully conscious, recognizes his dad, and converses with him. When his father returns to the room, Jason reverts at once to a zombie-like state. It is as if there are two Jasons trapped inside one body: the one connected to vision, who is alert but not conscious, and the one connected to hearing who is alert and conscious. What might these eerie comings and goings of conscious personhood reveal about how the brain generates self-awareness?

These may sound like phantasmagorical short stories by the likes of Edgar Allan Poe or Philip K. Dick. Yet they are all true, and these are only a few of the cases you will encounter in this book. An intensive study of these people can not only help us figure out why their bizarre symptoms occur, but also help us understand the functions of the normal brain—yours and mine. Maybe someday we will even answer the most difficult question of all: How does the human brain give rise to consciousness? What or who is this "I" within me that illuminates one tiny corner of the universe, while the rest of the cosmos rolls on indifferent to every human concern ...

When pondering our uniqueness, it is natural to wonder how close other species before us might have come to achieving our cognitive state of grace. Anthropologists have found that the hominin family tree branched many times in the past several million years. At various times numerous protohuman and human-like ape species thrived and roamed the earth, but for some reason our line is the only one that "made it."

...You may wonder, where does our uniqueness come from? As Shakespeare and Parmenides had already stated long before Darwin, nothing can come of nothing.

It is a common fallacy to assume that gradual, small changes can only engender gradual, incremental results. But this is linear thinking, which seems to be our

default mode for thinking about the world. ... Two stones feel twice as heavy as one stone. It takes three times as much food to feed three times as many people. And so on. But outside of the sphere of practical human concerns, nature is full of nonlinear phenomena. Highly complex processes can emerge from deceptively simple rules or parts, and small changes in one underlying factor of a complex system can engender radical, qualitative shifts in other factors that depend on it.

Think of this very simple example: Imagine you have block of ice in front of you and you are gradually warming it up: 20 degrees Fahrenheit.....21 degrees ... 22 degrees ... Most of the time, heating the ice up by one more degree doesn't have any interesting effect: all you have that you didn't have a minute ago is a slightly warmer block of ice. But then you come to 32 degrees Fahrenheit. As soon as you reach this critical temperature, you see an abrupt, dramatic change. The crystalline structure of the ice decoheres, and suddenly the water molecules start slipping and flowing around each other freely. Your frozen water has turned into liquid water, thanks to that one critical degree of heat energy. At that key point, incremental changes stopped having incremental effects, and precipitated a sudden qualitative change called a phase transition.

Nature is full of phase transitions... They can occur in social systems, for example, where millions of individual decisions or attitudes can interact to rapidly shift the entire system into a new balance. Phase transitions are afoot during speculative bubbles, stock market crashes, and spontaneous traffic jams. On a more positive note, they were on display in the breakup of the Soviet Bloc and the exponential rise of the Internet.

I would even suggest that phase transitions may apply to human origins. Over the millions of years that led up to *Homo sapiens*, natural selection continued to tinker with the brains of our ancestors in the normal evolutionary fashion— which is to say, gradual and piecemeal: a dime-sized expansion of the cortex here, a 5 percent thickening of the fiber tract connecting two structures there, and so on for countless generations. With

each new generation, the results of these slight neural improvements were apes who were slightly better at various things: slightly defter at wielding sticks and stones; slightly cleverer at social scheming, wheeling and dealing; slightly more foresightful about the behaviors of game or the portents of weather and season; slightly better at remembering the distant past and seeing connections to the present.

Then sometime about a hundred and fifty thousand years ago there was an explosive development of certain key brain structures and functions whose fortuitous combinations resulted in the mental abilities that make us special in the sense that I am arguing for. We went through a mental phase transition. All the same old parts were there, but they started working together in new ways that were far more than the sum of their parts. This transition brought us things like full-fledged human language, artistic and religious sensibilities, and consciousness and self-awareness. Within the space of perhaps thirty thousand years we began to build our own shelters, stitch hides and furs into garments, create shell jewelry and rock paintings, and carve flutes out of bones. We were more or less finished with genetic evolution, but had embarked on a much (much!) faster-paced form of evolution that acted not on genes but on culture.

— Excerpted from
The Tell-Tale Brain,
Unlocking the mystery of human nature
by V.S. Ramachandran

From ape to angel: Neuroscience's astonishing journey



VOICES



It was not very long ago, that my wife and I hung outside the office of the Iron Lady of St. Mary's, the late Mrs. Mathews, Principal of the Pune school. The first meeting was a damp squib as the school did not want students from the far away part of our town.

The next time, we carried xerox copies of both our driving licenses, and details of one of her former students, who was running a large corporation successfully. We were also ready with a well rehearsed statement on why it was so important for our daughter to get admitted to the K.G. Class.

Those who think St. Mary's is just another school, let me tell you, grownups learn as much about their responsibilities there, as their kids. The opening sentence of the principal in one of her meetings with the parents and their wards – "Hard work never really killed anyone" – still rings in my ears!

Over the years, like many fathers, I saw my daughter Manaswini grow from an easily influenced tiny tot to a delightfully discerning and difficult negotiator. For a salesman (at heart) like me, it was all in the game to be ignored, rejected, suspected and finally accepted.

Like other parents, we too had plans for our daughter. My wife, a doctor, brought her own views of what a worthwhile career should be, and I tried telling Manaswini how companies are managed and strategies are formulated. When her Std X exams were in full swing, my daughter asked me whether I would be disappointed if she didn't want to tend to the

sick or design equipment, but instead opt to teach Literature or Economics.

Her question took me back to my own student years. Though I studied engineering, theatre and literature was a preoccupation with our small group of friends. My closest friend and son of a renowned Malayalam writer, suffered the five years of Applied Mechanics and Hydraulics, only to pursue later, his interest in theatre. He now works for the Dept. of Culture in the Kerala Government; has his quaint house not far from the temple town of Guruvayoor.

This taught me a lesson that people can deliver value only through the power of choices they make of their own volition. In the corporate world, many executives excel not because they are highly qualified or educated, but rather, the slots they are in provide them an opportunity to pursue their interests and the freedom to make their choices.

Whether the study of Humanities is going to pay the bills seems to be the only dimension parents are concerned about and forget that it is one of the basic building blocks for our societies, so much in need of change and governance, and on a much larger and complex scale. By the way, pure sciences also are not finding many takers. Parents are also ignoring today's new career choices, options which just did not exist in our times.

Wealth and standard of living should be an outcome of the pursuit of one's interests. It can't be an end in itself. So why burden our kids with the legacy of earlier generations? It may only limit the realm of possibilities.

Coming back to my daughter's question, I told her that all I wanted was, that she be an honest, law abiding citizen, and pursue her interests; that life always has a way of taking care of you and balancing it.

As to the real dilemma before parents, when does one impose one's 'will' and when does one 'let go'? The answer does not lie with us, but rather with the person who is trying to decide his or her future.



L. Venkateswaran
Power O&M

Reels of insight : On an unusual film

These days it is not easy to get surprised. Media networks bombard us with news and stories so fast that even the past 30 minutes of our lives appear staler than yesterday's newspaper. A sense of sameness could be our constant companion as we feel we have heard that before; read this earlier; seen it all.

So, imagine my pleasant surprise when an unusual film, *Ship of Theseus* jolted my jaded responses. Written and directed by Anand Gandhi, the film presents three separate stories about three characters going through life-changing experiences. A blind photographer, relying on her ears and touch to take pictures, regains her eyesight through a cornea transplant. She finds it difficult to cope with the abundance of visuals that confront her. Can she regain the peace and purposefulness of those days when she couldn't see? In the second segment, a gentle monk, who is also an atheist, is fighting a legal case against pharma companies for their cruelty to animals used in clinical research. What happens when he refuses to take medicines, on being diagnosed with a liver condition? In the final story, we find a young man trading stocks from his hospital bed, even as he is recovering from a kidney transplant. He comes across a poor labourer whose kidney had been stolen during a routine operation and he decides to investigate. Is this money chaser capable of compassion?

As this deeply felt film takes us into the lives of its characters, questions begin to well up in our own minds: are we taking our vision for granted? Are our bodies nothing more than structures for our souls to perch on? What makes each of us unique: our original organs – eyes, heart, brain, liver – or something not really residing in any of these? *Ship of Theseus* is that rare film which succeeds in talking to us about ideas, expressed through the lives of its characters.

Is it a boring film? Only if one thinks that we have to leave our brains and hearts when

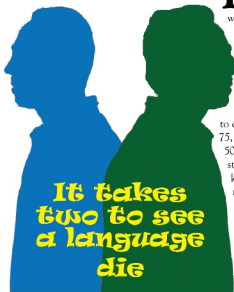
we are at the movies; that intelligence comes in the way of being entertained. Of course, it doesn't provide predictable stories, the familiar chicken soup for the soul, pre cooked and ready to digest. Yet, it held me in its spell all the way with its open ended explorations and superbly crafted images. After the photographer regains her vision, here is a sequence as she stands at a Mumbai intersection, camera in hand, suddenly overwhelmed by the hundred sights that bombard her. Each vehicle, each passing face becomes a stab of vision, too much to handle. Again, there is the unforgettable image of the monk, dressed in white walking painfully on a lonely stretch while giant fans of a wind farm loom in the backdrop – a shot that reminds us how far we have advanced and yet how vulnerable we remain.

Ship of Theseus has its own flashes of humour. There is the young lawyer, Charvaka who has bantering discussions with the monk. Once as they walk along, he playfully asks the sanyasi whose aim is to break free from the endless cycles of desire: Which email can attain cyber nirvana? Answer: the one without any attachments.

For someone so young (not yet 33), Anand Gandhi has made a wise film, luminous with his honesty and intelligence. One can see that these questions have troubled him, he has lived with them and to ask them in a form to be shared by many, he hasn't taken any short cuts, hasn't tried to please. Concentrating on what he has to say, and expressing it in the best possible way, he has created a stimulating film that stays with us long after the credits have rolled.

A.M. Roshan





In Mexico, the language of Ayapaneco has survived the Spanish conquest, seen off wars, revolutions, famines and floods. But now, like so many other indigenous languages, it's at risk of extinction.

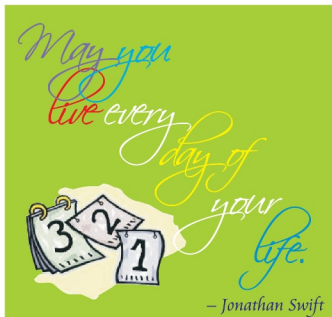
There are just two people left who can speak it fluently – but they refuse to talk to each other. Manuel Segovia, 75, and Isidro Velazquez, 69, live 500 metres apart in the southern state of Tabasco. ...people who know them say they have never really enjoyed each other's company.

"They don't have a lot in common," says Daniel Suslak, a linguistic anthropologist from Indiana University, who is involved with a project to produce a dictionary of Ayapaneco.

The dictionary is part of a race against time to revitalise the language before it is definitively too late. "When I was a boy everybody spoke it," Segovia told the Guardian by phone. "It's disappeared little by little, and now I suppose it might die with me."

—The Guardian

And this poster:



HOW NOT TO ESCAPE FROM WORK



A young Tokyo businesswoman tied herself up at home because she did not want to go to work, Japanese media reported.

The woman in her 20s was found at her apartment with her hands and legs bound with ropes and belts. The apartment owner discovered her unconscious but otherwise unhurt and he called the police and the ambulance, fearing the woman had been the victim of a vicious home robbery.

But detectives grew suspicious of the young tenant's story when they failed to turn up any evidence of forced entry to the flat. During questioning, the woman broke down and admitted there was nobody else involved.

"I did not want to go to work, so I did it as an excuse for absence without due notice," she told officers.

—Sanket Shimbun

SLICE
OF LIFE



At the Bhathena camp, young vacationers enjoyed snorkeling at Tarkarli beach, a visit to the Nehru Planetarium and Science Centre, life at a rural farm, kayaking at Tapola and a safari at the Chandrapur tiger reserve. In quiet meditative activity, they learnt Madhubani and Warli painting, calligraphy, origami, constructed a burglar alarm and participated in an awareness session on sexual abuse. Surely not your average summer camp activities.



So much
MORE
than a
summer
camp



Images of hope and accomplishment from a Municipal school



From the time they stepped into the 5th standard of KC Thackeray Vidya Niketan in 2007, these children have been gaining in confidence and skills. Responding to the loving care and guidance of their teachers and staff they defied government school patterns of drop-out rates and low performance.



Recently when the children appeared for the 10th Board exam, it was a first for a Pune Municipal English medium school. Their triumph – 100% pass, first class for 56% and distinction marks for another 22% – prove once again that given a nurturing environment, every child can blossom to find her real potential. And gives renewed hope for the educational experiment that Thermax Social Initiative Foundation began in partnership with the Pune Municipal Corporation and the Akanksha Foundation.

