CHAOS AND ITS ROLE IN THE BRAIN

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MODERN-DAY HUMAN SACRIFICE CRACKING THE VISUAL CODE: HOW WE SEE

PLUS: OUR ANNUAL TREASURE HUNT—AND A CACHE OF PRIZES



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10

By Bracon Lee Dischow It is read that everything is bagger in Texas as where ofce work you expect to find the lagoat scientific maturent even but?P hoboil pres wimat Calables asplans how \$0 bition and 30 triling election withir may leach so about the organ of the universe

14

Orrebus The Who s Who of contributing authors

18

Communications Readers white:

22

Forum By Justine Kaplan Do uneeptaneet phenomena such as Bigtoot warrant investigation? What do nive readies are?

24

Mend By Stave Naclis Turn of the lights, please Former LSD users are expenseding visual rerur that roat the work of late workt brevenen. Artist Stanistew Fernandes paints 'a vasari of cheatric enplosation in dealing with the monitories of thought and neares' Drivba appoared as the cover flustration on the bodit of the serve this by science fotoen sub-to Tarry Carr

25

By Curl Winkster These a severe storm watch precisited for the year tou can expect power outager but no rain. The only thing you'll be saturated with its sun rays

26 Space

By Jan Zeigler New power systems could have you rocketing to Mans on flighta departing from the moon A ore way top will seen at least 30 days, and thates no talk of a frequent filter program.

28

Arthibial Intelligence By R. Coin Johnson Things they not a changen After a good night s sleep and peasani direems year consuler will be retrashed for the clay's work

32

Explorations By Patrick Thermy Chusading for the gods A man with a mission, and a per-wetted mythology, is detecting inhabit from thousands of years ago And hea for thee, if you can hack him down

ON INSERTION IN TRANSPORT OF A SUB- A SUB-

33

Continuum Vanne woode a tale of a childhood love that grew who a lefetime clavation. Wit suppoors tale outra time lo bore ther petents? Is then a goll bail in your pocker, of any you caryong a meteory A brien-new careal whou the cardboard tacks

42

Get Bravil: Consoling Chaos By Korriero Machaths Device a state of desartsy refloct a state of desartsy refloct a legher from a lossify? New remainsch ritt of a scher? New remainsch ritt of a scher? New remainsch optersen herei of bran hunchoring can be actieved from a chaose state. Like the weld and where webb runds india evider is tha secured brokence.

54

Advanture Capital (b) Roberts Rosdenski Tables of surfavar almas that carried valuable arrga have spurred on mary a trasauce service too sey with the and of highlock experient, those vantures at soa--and capers on lead--are proving vary brothate for modern-table protos he Phosphan. Another load he Phosphan.









68

Property and the process of the apparent passe with which nature creates to being shapes has long basen missed by mst—captured in¹ ofs and on film And maw mathematics replaced the muse, the computed.

- 74

Interview By Daug Stewart Notel laurane David Hubel with panner Sciences were of how the train phoneses visual agnetia having other things Hubel's work has fied to a cure for orthin hinds of blandhoes

8

Attenuator Forred Martia Ighis Tearchop-shaped Barnes that variabilin the writk of an eyn. It's not only the Franch who entry munching on frogs' logs: the strangest evans of 1939, and being unsertpathetic men

113

The Fith Annual Great Onive Treasure Hant Dig through the pages of this issue to unewith heavenly riches

118

Gamas By Scot Morns Recips for a followin Takes an improbable story repeat incessority, and say it happeneed to

122

Bar Toch By Judy Feldman Pecycled and Earth safe products to help car when planet

124

Last Word

By Tern Naughton Your socks are single and you don't even twen a clothas dryar And who hasn't wolen up cold because the Liankes were wrapped asound his pertner? This month we expose these and other wonders.

50

Febrer: The Badness of Debal By Jonethan Carroll Athough bendfan Carroll with a state existence and a simple talefer I hode hersoft andowed with the abrity to transform her fature. The price site pays, knowledge



FIRST WORD

By Sheldon Lee Glashow

The SSC will enable scientists to search for the answer to a single produind puzzle. What is the origin of mass, resulting in the formation of atoms, motecules, our planet, and oursalves?** The application of the special control in (SSC) will be the welf-a larged scarsific instrumed and must powerful bigstops applications of the special scars of the second two scars of the special scars thread when happens when a postor with an analyzed 20 milice relation value colisies with reachers parters of the sizes many moving in the opposite direction when with a thinks is such exertine were minutes to pice actions there. If you minutes the pice actions there is the minutes of the sweethe and the ubmain relative of multiple

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was the flag bang, science's vehicle of Genala. The newborn universe was inconceinably hol, a benjifty burnel teebal where all low locks of hatse (the strong and weak forces, electromag beform, and gravity) were unabled.

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Struktor: Low Galafow, who was the Note! exacts is physics in 2018, is a professor at Harvard Driversity

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CONTRIBUTORS omnigus















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Way & Sona) P. Cola Johnson his own industry report called inclusions

Jan Ziegler (Boace, page 26) whithan phazus been inferented in choamors contributers to Ar & Spece and National Former Denna rapparch obliot Justine

Kaplan (Forum page 22) has written for

Theye always been better at loane Author of Natil Sale, a collection of

In measuring Get Smart Controling Chapti (page 42) Kathleen McAutite sancharrely chooses mannes for auckines in me finally have a poort excuse for beena

Doug Slowert (Interview with neurosci

Jonathan Cerrol I'The Sectness of Detail page 500 resides in Vierna Ha

Serve Nadis has written books about addition to Ornor Naidia has written for a

Patrick Tierney (Explorational page



LETTERS

COMMUNIC/ATIONS

Perchance to Dream

I thurst the article about load dreaming fasoinating and surphsingly logitimate while in a dream and use the evaluations to clistori or alter it was overwhelming Now Leaderly look forward to failing

Average Outpute

We are recovered currents a latters from Ward column in the November 1969 have any lease of a service of humor harrier could pat a lot of defensations little miting a cow or chicken Just about arvono, howevers, can get a dog or get we may have option from Lest Word?

Inspectly and the Last Word by net gournet Russell Jones 1 am delighted to see that Omy has realized how much importance: terrs is pets may play in "goldhish gumbo," will the ingredients are they plan to make him a menu welection? Jay Wenshenker

Getting Better Al the Time

I would like to extend much presse to your megazine. I have suit sociaved my out to write this latter Eacture I feel you subsorber is with your publication. I m sure that you and your outstanding stuff will keep up the superior work

Supernova, Aracona?

White we are experimenting at the limits exen in the standard model in physicsa concerned, according to Lean Ledormen Branvew, October 1966, former descfor of our Ferriry Nettorial Acceleration Laboratory in Detexia, illinois Should our tex closers be sport on research whoes of readily stars in a great catachem? We must carry out further corrected, .

Say & Agen. Zecheria

De article o the November 1989 resue concerning Zechana Sectaria Sump-Areynotted was excellent. Writer Mark Teigh is to be congreturated 1 also think

Canoin Park CA

Although I wouldn't want to get revolved an extension makery has occurred to of an advanced society, what role do you

Ko Rehardso Manchester, CI DCI

MYSTERY, THEY WROTE

FORUM

By Justine Kaplan

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decovery could shed new light on history as we know it in this region."

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A number of people offered a footpool method for oatching the Load Man. I is actually easis to be loops laced with McDonalde feh sandwiches which the creative supposedly state from the feel (and only include wherein

According to Jack Lapsettis a coolar spental in Rosetuag, Oregon, scientist don't conduct somous investigations of such mysteress bacaluse RTIs of no Andreg exists for field startles. Then an insertedit, justified meanshiel calmost



Could a tab sandwash oranash the anomaly?

make a living pursuing such endeevers." Lapsonte writes "1 know of no funding for an antinopologist or zoologist to research the Bigloot phenomenon."

Lack of lands heart prevented eleverances andexes from pursuing anomales Eighth gistel leaders kalling Peod from Stealacts. North Cabina for exemptie wole is about her baident who medipated the Servers gains a server of anomeleus annul earthquistes annual to the cost in Connectual. This phenomenon occurs in Marth Cabinavia costel areas of Lapie Fier

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The Shelfolte Middle School students repeated into a definitive explanation for the Senece gun queles but they wered to knew studying the phonomenan. Who knows what they il decover? Perhops well see their names in the inemation of heater books CO

AFTER LIGHTS

By Steve Nadis

In this 1994 paper titled "Advorce Persoacen to Psycholdics prychin var Pachard Brinsman of kind a outcomy must about flashbacks fregmanary unexpected recurrences of a post haltware genes ceptificnos Using the sem advises when decusring handbacks can be thought with interpretise directions. Smallman words, another and protections and sendering networks have tho

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Abiaham has identified ten district. visual perturbations triggered by 19



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Benchmackers con velocity and work between the second second second second second to sharp a second second second second second to sharp a second second second second second to sharp a second second second second second test and second second second second second test and second second

The process of periodization options when receptore life through signals that are normally suppressed. The shorts a haightened response. "We know that sensitization may occur in humans metals of neurolization. BANE DE SOLEIL



By Curt Wohleber

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Solar fieres are like grant time bombs in the sun. When conditions are right, energy trapped in the solar coronal by immensiely powerkal magnetic fields is explosively released ituring bursts of intense redinicer, shock waves, and charged particles

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Asymptotic features have closely followed the solar cycle since the 1840's when a German appthecary. Henceh Schwabe



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By Jan Ziogler

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This vignetia may someclay come true days These rockel dees rance form

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clear rocket, can operate at higher THERE UP and then should out the socieit's Fast lane Most as a fixee-tooth contrude?

of, Bolowski says so were not

in California indicate high power versions of this system could make a

But these three reactor based power plants have a big problem. They respace has its critica. "Were agenst



in California an inortial lusion rocket could

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cost to develop them. Not one of them is popolio the moon or Mars in the Iver Bekey says But some peoplesystem path in the twonty-list century cars he rac DO

SPEAK, MEMORY

ARTIFICIAL

By R. Colin Johnson

Cause pol to make sure they get actess egen hours of skep actess egen hours of skep to the first employee of Syntonics Systems: Weakeever you do, don't put their pupp--you il will them.

Someday Tapang, the founder of the Oregon-based company, will probably offer that advoce about his cognizers modeled after human cognition.

Computer annualisation of the Dennin more basic Ancores—anthonia feasial use retreated—anthonia to the Dennin enclosedue backetope firms employ them to pendid the movement of about process and the motion the bank of bank and the motion of the the set baselihead is the not peneticin of motions motion theory to the process motion the peneticin of the motion and the motion peneticin of bank motions intelligence of bank motions intelligence of back motions intelligence of the theory and the set of harmon penetics cognitive facilities about these ones to cognitive facilities about these ones to cognitive motions about these ones to cognitive motions about these

Such a technological advance is not far off in the near future. Tapeng hopis to markal cognizer monochips able to bostow genuite intelligence upon any computer in which thay are installed

The check will be privater in Negrotians expression to the weat problem of loss storage and the storage problem of loss storage - hardwise to device outfit a storage - hardwise to device outfit a storage - hardwise to device outfit a storage of the storage of the basis to find matterning a second of an indexis as experiments. This process indexis to observe the storage of s



Making Mr. Bright. Someday dasa now machines risty have a hortexn face. In CMM

process of human visual perception

Though you can Lung ag organizer you co have to bed here goods in tight. "They must along." Togang organise "My how replace the condeck after hummers. They can stay availed for out faces to hwerey-face that to be then they made about organ house of met to get entergeted. The parter them to along by closing their regist and of the services that is by lotting them num with the most them the categota world.

Cognose also recoil to dream during each of their inghts: During linear alwap periods a special decid, on the drag senses in need to dream and inggers a model that linguing has althopast comparison for FBM rogation to associ, business the anology with FBM safety, business my dreams and the much safety, business my dreams and the much and provide insular instructions and experiments.

An aga old philosophical problem has been whether a human nomania the aims parent heaughout (Mo-despite arrhapse, close braches with death and heal As for haranse his public has spakend mynad recores none of which has proved the dentritive animum. But for layang such problems are easy. "We are our encores." The same as long as the power has not been merupated

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SACRIFICIAL LAM

EXPLORATIONS

By Patrick Tierney

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A practicing human sacrificer Cos is a mesonary determined to win converts to what impurite to his own mythology Based on study represented on pre-Columbian toxidia and pottery Coses sacrificant real and address or bit those performed by South America's Moche werning-greets 11 700 years ago

In nociet years there have been recenting unitod of cut musclets. List April 15 victims—scene with ther herets and brains excessed and their initials codeed up in a widths time—wrot discovered in Mattemping, Meeco Their alonged executioners, let (by a Cuban drug ensugger sachtosid hahm in Behopa of ganning protection agenet law entocement officials. But blood sentrace—welfner of humans of awmake—welfne discuss and index under act westigetes and index official index act westigetes and antihopologistis with a contract to Ind sincoffer welfner of large-scale exerction at ancient New Works take

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Accounting to Domain in his book, Meanle Ant of Peru: "The killing of captured wemons occurrent will a spacely ossenancy in which their throats were out and their blood presented in tell opolets to elegantly chested inferioad



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CONTINUUM

TALES FROM THE VIENNESE WOODS

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Many years ago I ordened a touctar, a peoper actor, time spet these. When is objected or years at the trans relation – he was sent to me as length—I made an eccessfully set decomp. The third is to objective youtbacked on the buttern of the capp, neiting its fixed on the movemum back. He goes which is back to the touch relative back the ductors are of the touch and the touch back to ductors and the touch and the set of the touch set of their object of the back the set of the touch of the and the touch and the set of the touch set of the other of back back to any the set of the touch set of their object of the back to affer the touch set of the touch set of the back to affer the touch set of the

Thet night lifet; him in a watte room. The following morning

I were in centers to find a best corpore that I save a bird final tools increased may segmentary and represents inderival, as burd that was burdy strateging the works occurse in a cage. The too can was utered y recorded. The indexicol of the codel are had obsaude that to make han indexime modelinely. The patient list the predemoted was a convisious indexicol, or the codel are had expedienced was a convisious indexicol, or the codel are had expedienced base. A fear motifies save, where at his features are that the complete that a base the features are that the complete that a base the features.

These excellents' interceptes of the time when the meastows adopt the Constances may involve in Alendering enter not yet destroyed by the dam. The summers in tiss almost paraval forest—abody after the way when twee released from a So well phase. Here interview and the foce days there seen meast owkards such as one hardly insis today. Every type of animal adopt them tweetheres, notices, having, and more others.

Today our hisse as proty quest. There is the hops, and the shards, which are sharedy jusging about the armsi of spring. Down in the large escarses I have cosen ten, primatry out in the large most instead of the shared shared tensy. And, my latest achievement, completely orchary cance as Argence can rease them where the there are have prior a child about have grain. For my every armitilia a eighthy less gather but werk ideate colleague.

What is all for lars are a christ, inder do as research My matchine cancer, and a boy developed graduativity in increase termine research. Schlading provent from play. If is that, Tomory plans. Schooring player to schwarge plans, and the termination lot its principles of the scheme alexystimiser scheder that is of the market of the scheme alexystimiser scheder. The market is play to how a righter time of alexystimiser scheder that the market market of the scheme alexystimiser scheder. The market market market was alexystimiser to play and an annual termination and the scheme alexystimiser to be scheme that they can be an effect that the scheme to be schemes that they can be alexystimiser to be an annual termination and the scheme that they scheme that they can be the scheme that they scheme that they can be schemes the schemes that they can be schemes that they can be schemes they can be schemes the schemes

Except April On Late and Living Joy Xossad Loans and Kurt Mühol constance by Rehmer D. Rosty, to to published in Alexch by Sc. Marchin Press, New York Dosmar diad on Faturatory 27, 1988 (



FINGER FRUITS

Three years ago U.S. Department of Agnocalure suscentrie Pany Nagent was challenged by a somption Tot lake to see a malon ansal anough to set in a vender machine Intergued Nupport expressible was able on Charleston, South Caroline and begas executing for a metor that would be smulerough to stack mb a vend ing machine site and could be exten its or and all

Doagn Nugarot e efforts are begrenning to see fruit He has obselored domestic cantalouge and honestic cantalouge and honestic exit document of wareful of war makins some of which are as senal as an orgo The senal to a grappingly make which a marginally endore with a marginally make which a marginally to shaw the assenal lost of table skin (Li a bits toogh to shaw the assenal of table skin (Li a bits toogh to shaw the assenal of table skin (Li a bits toogh

Nagent is continuing to briller with the new that, and hopes to produce the period winding machine melion within the next five years — Bill Lowren



A lattic of react / Jons Swite Og 204ally etition



A service of genuss. The Malaysiam () I when is as hasty as it is veromicus. But modecal remembers have managed to mak a new inwacte from its lange.

THE BEST OF THE VIPERS

Although it sounds improb able vences from the Malayaan pit viper occild same your le expectally if you're a atoke veten with a blood clot oversit brain.

University of linear Health Sciences Center's David D Sciences notice hat many people better by Melaysen pa vppris del not filter in the lower sold effects of the vencer but from internal blokding Further studies have shown hat the vencer centers and taging a parameterization of the information of the parameterization of has a respective trapper to take an experiment to the last to solution of the solution of Status and parameterization of the description of the last to the description of the the the description of the the description of the between an other the version must be used the version the the solution of the the version the the solution of the the version the solution of the so doce could kel a patient with the same ease that a pit viper bite does

The expenses is drug when cask succ. \$200 to hadrone parson is poclassish from a weekly million of sense hadrone to pohadrone hadrone hadr

QUASI-HUMANS

The Six Mitrice Dacker Alex and the Bione Woman were TV's first syborgs—part human, part alchnowaatschy Wei may soon two in a wold popklated by frisse beings taturat Jacome Glann belevels, because we are environ after them.

Cyclope, say, Clean Asthe investation candid of two brends about to merge with invested and the service of the pacify invested and the pacify invested and the invested invest- the invested invested and the invested invested invested and the invested and the

Glenn says that the two brands will usher in an age of "constatous technology in which "rotable will get tro-



Testing places. Cytongs control when humans inave off

type to taxcome more human ind turners will become systemps' within the final half if the twenty-first century

By their bechnology work to be writed to anoty convectory deablifters but will increase ingly be used to enhance the latine loady a performance Contact brieve while acomvision to here additional dearring another defaultions on members that access on members to access and beach out and locab earth one way aut accord the www.intum enhances access to any out access and perpared out and locab earth one way aut accord the

While he is contained that he has seen the Luure that leads at each for further thy Darm ack nonleading there is not to be overcome. As location amount of roset mice to be overcome. As location and the second of the accessed i close there any ofference with the accessed i close there any ofference with the

"We must always have old memories and young hopes —Assare resusser

SILVER FUTURES

Satch for stach, pivor

serves you before them nylon when it cannes to healing wounds. That is the word from deemet Chill Chang Chu of Correl Lawersey in Fisca, New York who is experimenting with the healing properties of selver succes.

targ taken incom ta the face antimorobal properties making it is good concludes for doang wounds vulnerable to infection. But the real took, and Chu't mel contribu-

A saver trang to surgery. Get a precisus metal chargod was elegine. taxtori make amends a the body?

Let's electricity of the offee financial. When a timy current passes inhough reyor financial costed with taken core of anyma are released. These premisers and any any any any file solver success, in CIN a words "cellinately better the toleraway darly repute like solar would be the the toleraway darly repute like solar would be the source of the sources or wounds roused by accenters.

So ler Chu hea done a bactenai outure test and one anmal soudy that have estabished the compatibility of silver sources with surtounding iver tesue. Eventually he lotesees a system in which strong up patients will carry Walkmanike portable cloc trong spits that sond hearing carries to the wound zones

Ine costr without the electricity-perference of says Citul sever substress will be signify more expentione that normal substress which run batwoon 50 conts and a dollar per foot ____PUI seven

"A hospital should also have a racovary soom adjorning the casher's office —Frances O Welsh



CONTINUUM

ALIEN BACK TALK

BETI-parties search for will get a 500 million toost from 1800 million toost holds a get a search search holds a get a search search holds a get a search search and the the backcard and hole phanet search hole the the hole hole memory hole hole hole when hole the phanet search hole hol

to answe that qualifies, NASA pisckloed a document called the Dackaratori of Pericoples as a guide to any one who might be in the text least flavd whon the resoupper anniver. Before interiorg any public announcement, this document warrs, the learners infolded first assuma the signal a content rates. This signal a content to sail E. Il mada apparent to sail the sail sail

This NAEA document satio along the tissue saying, No resources wheek's beavril. "At this port the guide inner suggest a planetwide one subset before the logith the helio but leave the logith the site authorities."



Star search in Now that NASA's SETE program has received a finance boost this transist paiston has yet to be addressed.

NOSE NEWS IS GOOL NEWS

The private comparison of the private of the privat

The constraint of the constrai

When Black issess women whenever, he results were exactly the opposite They performed 33 percent better on spatial skills when beathing through the fait road/ and a bit better on verball basis when breathing through the optim road/

Block concerdes that he



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have a sequence on the mean in most the determinist model approve to detrovales the hermosphere control to same adde of the brain most they adde of the brain most they been approved to the to be the second to the same and the second to the second to the the second to the second tot

Biopsychologist Avery, Gribert belavies five acreating spices in pass or when name cycles of the but he critbars and the spin to pursue the says of Book's work. Other people have bookd araffow and bisen function belase and fixed to connect the two — Present Book

Al a center age some people s minds close up they live on their intellectual



Give on sheller. A strawing neeks ray owned the Actionan coopedia to a few owers, in motion-Rende, but the practicate reprises have a knock for initiang places that humans still place.

EFRIE CANAL

The Family Power and Light Company (FL) load one purpose for is 100 miles of heating, Linning carnus in the southwatern to of the state is boot weter classifting of her to Tarkey. Poet nuclear power paint 'He this untilestant (and nervidisactive) cannot have had a distect. They we boothe a home for the endangened Ammann possible.

The crocs distriguished from their alligetor cousins by a sharper shoul and a preference for sait water with in The sound callable blockup their large earthon bettes provide resting stars. Turkey Points canais are one of just three American nesting grounds for the croecoldias the others—both in Florida are the Everyladee National Park and a special

perk set askte in Key Lango Al least ask neats have been idantified at Turkay Pont this yeer with close to 100 new headhings sociang

"What were trying to show is that they can go about their business and we can go stout cure: says FPL's Ross Whox ---George Notible

BRAN NEW

Been barn is good to you but many people inditio dry grany week a tide tough to stemach but now in secrobes at the Agriculture Research Service (ARS) of the U.S. Department of Agriculture here loads at way to shear the you're classics. Team noh now residence toen noh now residence toen noh now residence toen noh now residence toen reparted

The garity tasks of bean ARS brochamist J. Mich aal Sould explains is caused by grant, a knot of "plant glue" hat softens the call wars or calls when wask hydrogenparasetis solution. He igninbroates down, leaving the trans tasks behavil builting the trans basis behavil builting trans benefits vitact. After reacting with plant material, hair hydrogen percente hair missely disapting with marting with re-

-Dorothy Soliteuer



A subbre gashe other,

CONTINUUM



Medinen

-Holeen Street

"Madress is to think of too



-Vature dents toping from from

BORED SENSELESS

Everyone has heard the adapting toroid and feeling no part. Well in turns out to be true. A 1988 study by Welcomer X tarwowels of the University of Lowelle and two colleagues in Poland found that when people and board. that when people and board. That when people and board.

Kerewakis and his cohorts, docided to rott fue yeakas of media fuenza the posterior group of 30 werner in hard group of 30 werner in hard or which distights premises (NUTe) absched to com upon Ore group weakates or which distights premises (NUTe) absched to com upon Ore group weakates or simulate the anati while first of regroup weakates me hard weakates in his factor groups weatates in his doct groups weatates in his doct groups weatates in his doct groups weatates in the factor the com passes. This extorme with the distribution grades and the distribution grades are both the compassion weakates of the



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registering is induced in the second provided in we based in the second second second being of plane waves of all out being of plane is arrighted says Kaneworkii. Bereaten says Kaneworkii: Bereaten says and plane arritering second second second second in adds. Linderstmmaked we load pain loss intercely Kaneworkii to program Kaneworkii to program acceler barrage of basis for this summer to verify his rebell functions.

With such data in hand, Knowoode neormends bering parlients who are clue for support A patient may be less support patient may be in at aveniminated he support and exothermal because it occur cless for a patient to anod ecotoment because it occur cless for a present perception of perpertages leading to complecotions and unnecessary sufferers — hyperat Blace

PINKY THE PTEROSAUR

Some had a wrigspan tagen than a Bowing 2474 -Others would have been dwarted by convex. For mitlens of years placeauses were that about a placeause were that about types [sma were that about types [sma bases with their types [sma have a find in Brazil has incovered a precision has incovered a precision has write to the benefat finaand what fine previewed the

Developed Maritie of the Open-Linversety on Mattern Kayness, Create Betrann, discovered the phenoteum in a box of local bornes stored in the bases matter of a Hou due Janeo masterni. Although index House boen found, this one proved to be a culospeal ancorrely "That all agentic of Dissakado sign attached, saya Markil with bibliomet the curefulue was so well preserved by cause it deed in a cherryoal laden lake. The only the second plesosaur spoorner fraud plesosaur spoorner fraud sets press don mill.

Under examination by an electron microscope the lisp layer of the plenteesin's very thin op-demis looks much like heman skin. Martill molas: "It has a creationed patient and writikes like the back of a human term."

CONTINUUM

PETAL PUSHER

Every child known the verse "Will you welk into my perice?" seek the specter to the fig. Now there is exclence that some specter go to great length to versione insects by decorating that "periors" in a way that attacks in association back

Lest summer installations, exologing Catholica Chain geologing Catholica Chain Benarco of Mas Linewrahy analyzed Ital social profile areas of Mas Linewrahy analyzed Ital social profile cospective the wheeling Social cospective the wheeling Social of words, usin cet the matter of analyzed to the words of a words, usin cet the matter of the social and the social the social and the social social the words with a the places that reflect the social to the words word and social to the words words and social to the social to the social and the social to the social to the social and the social to the social to the social and the social to the social to the social and the social to the social to the social and the social to the social to the social and the social to the social to the social and the social to the social to the social and the social to the social to the social to the social and the social to the social to the social to the social and the social to the social to the social to the social and the social to the social to the social to the social and the social to the social to the social to the social and the social to the social to the social to the social and the social to the social to the social to the social and the social to the social to the social to the social and the social to the social

Insects Benard explains use frem delyr to see utilized exurces in flowers and funge sources in flowers and funge their reflect UV light Spublins like the occentron garden parties to place UV reflectors may the center of their stiffak webs. This insects are obtain footed into finking and other to be the other of their stiffak residue and the stiffak place of the stiffak residue and the st



Making your recto and lying in it. A spanking prospect for numpry insists on the providior Bowers.

WO-ALARM ZIPPER

Whan Swadish angino ar alidaon Sunchask has palsindo fae spagin in 1972 re dickt reacize that his invanton would create one of his most emissionawing moments—namdy, when one brights or zpi up. New do registro up up. New do reach zow with it zpiper duals to begin with?

To constail this proceed, Darry Stanberg an inventor living in Tokyo has isoarify invented "Zp Sure" a speoally designed apper fisal alerts ifs waarie when his or harf to isocon. If the apport sign or matine base openbandy closed component enda signal to a end-ofvestar presumably foolin the abardeen of the second to these bardeen and know of a filese to another part of enfance to enother part of enfance when weathers hang up they perfore use the fided be same and bardeen.

SAFE MAVEN

If you stash all your velosplea in a sale. Univergithat they is secure from theit forget is. You—or your veloables—could fail victure to a robot that classly comise ration sales at world-record securit.

What len years as a kcksymb act sake mechanic bon Bas turned to mechanic den the began daveloping UCMERCE (you are min op), a satehorecope-award setel that can cricik a thiveo issee that can cricik a thiveo sector sate amount time as the sector sate amount time as the very state to the sate to the sate events tables turned to the sate

Ber snys hat the node is prenary macros will be to open aufers tar people who have forgetten her contentitions it will also be used to crack able the have been seeed by the police. But croose bewen: Owning the device without a locioimther learners could be a biory allanse because the node would be considered a borner's stol.

-Gregory T Pope



GET SMART: CONTROLLING CHAOS

ARTICLE

Disorder, whether on Wall Street or in our minds, may just be a higher form of order BY KATHLEEN McAULIFFE

In control to the control of the

PAINTINGS BY STANISLAW FERNANDES

This fielding accordence and administic literates paperalle interprotecting space. The consequence is a space occurrent to the space occurrent to the space paperal space and the space before the space administic space before the space administic space before the space administic space before the space occurrent the space before the space that the space that the space that the space before befo

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the human blain. The time-bound bandlo of withese packs is a whopong to billion neurons each bapatie of forming as many as 50 600 connectants which offer ones. The adds up to more than 100 hillion connectants — or many more fail than make up any consumer so tar coamed of than make up any consumer so tar coamed of

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These there this staticity is a science-but stratege Ornat to support on incredience one Blanc, During Strate During Ornat to the Strate Strategies and Strategies and Strate During the strategies and strategies and strategies and strategies and possibility of the strategies and strategies and strategies and possibility of the strategies and considered and produces and strategies and strategies and the strategies and strate

Because nonlinear equations can be applied to phenomena

How can man be do-

matical materiase as the wastlet while water, or Wall Street? In the language of scartfails, all these phenoteness and other obc; or infreemity unpredictable. Although they deemonitate of adard to track, here eyethere dury language forecasts that cannot know what you will be thereing the weeks from Lacobard to reach the prediction of the second material and the prediction of the second material and the second

before many compared that concerne of a profession there are a set of the there is a set of the there is a set of the there is a set of the the set of the the set of the the set of the the set of the the set of the the set of the s

The results for the ordering predictability becomes apparent fram a closer setuneation of the arrow Fram the moment it issues the bow the starting conditions (with the osception of an insultance) neur again influenza is octains. Consequently, the arrow and other objects of classical physics (klowin a smooth uninterrupted path. On a graph there between can always be picture as a gracularly slowing in the

Chapter systems are not so obliging -- hence the term notive air dynamics. Such phenomena are suitating by complex tops of laceback, in which the acteomas of miss input are diseted back into the system it unpredictible ports in its cycle. One pandular amerga is and the with a regular methor, but if a struck by the ball of a second pandular before reaching das anth: both pendulars may been awange in a wild error.

ABSOLUT

This superb works su distilled from grann grown sixels falled a southern from the southern for the southern for southern and the southern of distillences near from maccolonness with most line to pass of Jourdisk Raddim Solotat Source 1870, 80 PROF

IMPORTED

fairhoo Bimliony, whon an open breaker bounces of a jethy it will called with oneorring waves that whocely antiance or dominish too in the break load. If the electrical impulse of one neutro goal on practicasity and provide the practicasity and provide the practicasity and provide the practicasity and provide the practicasity and the provide the providet provide the provide the

Similal wonder that a map of in future corrers a gavely consurred by a wild tangle of tagectones. The is the maps of chace--of-wond, of wester, of mind fast to the uter darmay of assertings. In did not turn cut to be the unity departed everycons ferred. While begin is a final proble of tagectones devenuelly assamed a form--a ghostly geometry celede a simple attractor.

"The first sime i ran on EEG signal through accrytuer hait transformed i intra gewinner mage leadottid softeting bewinnergi and ugy, in callis Rappi I Instead there was the skazaha, Rappi I Instead there was the skazaha, Rappi I Instead there was the skazaha, Rappi I Instead there sold ugs, and with auch ratation another pearl untidal I Said. Tuccol Lock" ("Win colleaguest reasonas horawith leadottid or postanty." No shit ()

The party of low Rep Learner eccament with the mathematical works of a scale year barry of the Re Topol rise or any of the Re Topol rise of the Re Topol rise prevention arrange and the scale of the Re Topol rise to a log isotopol of mathematicas limited in the Rest and the scale of the scale of the topol rise in the control the scale of the topol rise in the scale and the scale of the topol isotopol and the scale of the scale of the topol isotopol and the scale of the topol rise in the scale and with its mathematica and grant barrow rise in the topol pole with an entermode without contrary copies pelopholitation und the and topol pelopholitation und the and topol pelopholitation und the and topol pelopholitation und the and the scale of the sca

Rupp, who ddimanchan 78 opreso 10 bernm, haa caredo unbeel lewinferty stactbarse. But he has also taken some declars from this path. As an undergraduate at the University of Binas in Urbana, he board himsed from 16 physiology and poetry. Tit devined on the test the energy leader from 16 physiology and poetry. Tit devined on the test the energy leader from 16 physiology and poetry. Tit devined on the test the energy leader for the the taken engything poetries and typing to than engything good about here the

Alter graduating summa cum laude Rapp soli had a yearning for learning winch his porcused in English di Dambridge 5 postigious department of appled methematics and thousellad bhosic. These, at home in this "wonderful community of unfettered loones." hereabmergoid himself in the authematics of "belogical oscillatori", bechemical reactions that can suddenly be amplified or diminished through complex feedback loops. The equations dissoribing the reactions were nonlinesr, which miselinesr back pages of unruly numbers whitmed by pages of unruly numbers.

Itwenow framed Sevenites and sevenites in the temp weeklew of this interactivities probper that had gates anonhood for more meteorology outrail in 1963, he page was by Edwards Lorenz of the Nassachusetts institutia of Technology, dentation of the sevenite dentation of the sevenite dentation of the sevenite meteorology and the sevenite and the sevenite dentation of the sevenite of the sevenites and an entrying was the sevenites and an entrying was the sevenites and an entrying was sevenites.

After struggling with the equations and getting nowhere. Lorenz plugged them into a computer-will something of a novely for research laboratories of their rea-wind used a primitive graphics generator to display the results.

Eggin heart hinked at learning the span into one control and han control in span into one control and han control in the span into one control and han control in the span into one control in the span into heart han to control heart and heart han to control heart and heart han to control heart and heart han the control heart in heart han the span into the into a control heart and heart han the span into the heart heart heart and heart heart heart and heart heart heart and heart he

What watch is a strange attractor, and how can a structure wherego cut of descript². Think of Li, Says Resp. Tas in disakted disks lowerd whorth an unpredictable—that is obtange—system to attractivit. The structure strems from the last that the balawior of the system or to totally rendom. Refine, the system vacidates environity within a particular runga, or norm.

Consider Constant There are record high and back integradance in the deriver what is normal weather on this glanet in Larence's model that range in specfield by the boundaries of the dominoand motion reverse acoust outside of and motion reverse acoust outside of 200° F. Bac writin the "incremal" range. Teach barry themperature—hence motion on the suitable of the domino is umticated by the incremal acoustic outside the suitable of the domino is umticated on the suitable of the domino is marker in a symbol of "bounder modtionation are symbol of "bounder modtionationationation and the state of the source of the suitable of the source of

PHENOMENON

These mights have being a character or construction of the interface means the corran between the interface means the interface of the interface means of the interface means the particular between the construction of the Character Source have even extend in bounded means and the particular bounded of the particular bounded and bounded of the particular bounded and particular bounded with the work of particular particular bounded of the of source in device bounded with the work of the interface and where the source is the of source in device bounded with the work of the interface of the bounded with the work of the interface of the bounded of the interparts of source interface of the bounded of the bounded of source in device bounded of the bounded of the of source interface of the bounded of the bounded of the bounded of source interface of the bounded of the bounded of the bounded of source interface of the bounded of the bounded of the bounded of source interface of the bounded of the bounde

To be suite, checko fluctuations in the brisin may occasionality be harmful—or so necessfri on schoophrena suggests. But the lacost findings show that is marry instances, the bean functione normaly and even optimally—in a checko store.

When onergiging the tables of harmwrise. Repp has also come around to this fixedlier view. When we are healthy and alert, the interval between electrical wavas is never rigidly fixed, the reports, "but always vocifiates mound a certain frequency range "Moreover when we are issentially challings, the interval beseen the electrical weves becomes exernifice variable—or chaste. This suggests in Rept's opmen, that chase "may actually be highly bendfoal cuing problem solving."

Substantial errors used in advancement of the second errors and the second errors of the distribution of the second errors of the distribution of the second errors of the second

In a related expertment the subject is asked to press a bullon every fime to



metam- and low-pitched torke. The sample datacks or generate thindure releval to the IFEG most complex during the passentiation of the normalized tones. Rapp's explanation: As soon as the subject hermit als indigi-pitched tone his brain converges on the ognoand goes into a simpler, less charke alla of activity. What does all his meen? In Rapo's

What does all his men? In Rapp's opmon, chuck schulp may be an asset in problem solving. "Nou work to betoors as possible and avoid looking on to a suboptimal solution early on," he explains "Dne way to do that is to have a cartain amount of discribines, or latibulence in your seech."

Repet expected to Prever by portring to the addresses and to in stored Mrsch porter portugations and the store of the store Mrsch porter portugation and the store of the store Mrsch porter portugation and the store of the prevent store of the store of the store of the prevent store of the store of the store of the prevent store of the store of the store of the prevent store of the store of the store of the prevent store of the store of the store of the prevent store of the store of

This is where randomnesi contes is bandy if the ball is set loose explains Rapp, it will simply roll to the bottom of the nearest value—probably. Not the basis solution built it is grave a filler many dom rappe, the ball will be still to applace many more value botto solting down. In this way the neural net may field a better solution.

The result can be orthogy enclosed: or in the cano we say the human probem canops can lead to enclosed and the answer of the canops and the enclosed of the enclosed of the canops and the enclosed of the enclosed of the enclosed of the interaction of the enclosed of the percenter of the enclosed of the percenter of the enclosed that enclosed of the enclosed of the enclosed the enclosed of the enclosed of the enclosed of the enclosed that enclosed of the enclosed of the enclosed of the enclosed the enclosed of the enclosed of the enclosed of the enclosed the enclosed of the enclosed of the enclosed of the enclosed the enclosed of the enclosed of the enclosed of the enclosed the enclosed of the enclosed of the enclosed of the enclosed the enclosed of the enclosed the enclosed of the enclosed of the enclosed of the enclosed the enclosed of the enclos

Integratingly, outside of artificial intellgence such nandom search systems have been used by computers to genester very good —bough not measurelythe beet—aduptions to problems in the load amount of time. For example, tell

CONTINUED ON MOZ 56





have to order much a oup of tea or a plass of wrst. The crossents porns ivered twice a day Late in the evening, et watch A wonderful treat is to go in

The Bremen is open nineteen hours a day December twenty-lourfu is the onless lonely on a day when people

Them are small and clears and a Ma .-the least salue of your favority maga-

I often went in to se.

you all of Mahier s Fifth meent for an autience of does it at their own penil

and everything leals meener, harder edged. A day to stev inside and read e

talet paper, glue, salt. Things no one and are then needed desperately. An self running around, doing thanklass er-Walking in, wet and loaded down

with bags. I think I grouped with soy by Hiew to it like a tired robin to its nest

as always draped catefully over his arm

He suggested a piece of cream

rain How long could it have been two the booth behald, someone gave a

Embarrassed I fumed and saw an old man with a very perk face glaring at me

The periect end to a period day. Now



I marke an "exquise me" face and was about to turn accurd even when out of ber of photographs he had spread out

He reached behind him and picking it, he said, 'That is your son in nine years. He's wearing a patch because know, but one needs good everyght for

My son Adam is mon and the only

color procision flying teams. There are ts a little overwheiming. Recently he spent a weak writing to all of the major ing what one has to do to qualify as a tie boy with a crew cut and smart creen dom billiamess, and rohope it was obvone you disneer at or move to avoid if

> Importing the multilation ically, it does heppen, the resconsibrity of feer lives i remember so Macheth who upon learning of the deeths of celling them "chicks Where are all my ittle son wearing an eye petch

gave me the taste of blood in my mouth.

dworoe. He thinks that new mustache is becoming I think if a little sity."

grow a mustache Each one looked began one at the same time as he becan an effer. That succed them,

silv heavy metal (an T-shirts (covered nous about that was Adam had recent-

Wy rawne is Thursday, Frau Becker 'Today at Thursday'

I'd be Wednesday-

Who are you? What's this about?

of them Futures are unstable, tricky

you handle your life and those around you this is what will happen ' He pointboth hands in a gesture that said, What can you do? That's the way this

er alept with will

No one knew that Not my husone Leon Bell bed What do you

toonaph out of my back on the Inible

change They're optiable thing I m here to negotiate

that you want?" Your talent Re-

ing you did the othwants Bring metho exture and your

"Those all? It was only a sketchillit, away and got married. Marriage (and

"How can I believe you?"

He picked up a photograph that had been covered by the others. He held it in front of my eyes, my old bedroom

"I don't even know you. Why are you ... I was better than I really was doing this to me?"

they were cards he was about to shuf-

I was pretty good once. Went to art reacted to that? Got acared | partled looking carefully at my work and with "I don't believe it Get away from their hinds on the checkbooks, i son ry but rever had the kind of persistence

ligh of pents and two stretched can only "art" I we done in the last years has

Plus the sketchbook, my oldest

now except to tell you more about me, if the picture of Leon and me together that interests you " Or meybe I'll only

it generally depresses me, even the to a bin party sist after we ware mar ned. Or one of Willy at his desk, smoking a crost, so happy to be finding the

> von Erlach that he even published. I great datail, but all I He I have and I enough to think I I went through everuthing wastebaspapers How brutal-

when you can't ind looking for be-

env-hiding the thing you need, indifcoal pocket. Neither the gray pranes under the bods nor the false pre-and fered anything. Would my son really

It was a temple repht trying to be suply asked if anyon had rare t in ther travels. No one had They were

Throughout the evening I kept glungson to search. He had plain eyes but Every were smart and meloomero. He

At midnight there were no further

FATE IS A

NEGOTIABLE

AND IM HERF

NOW IO

Stand at the stohen table with a glass of orange when I met Thurswas such a simple ing room and gol

Willy bought the shift by the ream be-You don't feel guilty crumpling up a

damned drawing and not thinking about it again A child standing under a tree & little out in jeans & chestout

It took five minutes to do five minfive more menutes with it in my lap, know-

sat down. Thursday was tapping an in-Yes It's in my bag

Everything about him relevent Him with the rest of his palm on the table he ed to the second drawing "Do you

leaned back against the velvet seat

As coolly as I could I pulled the wrin-

pled up the crewing into a light ball to perhaps fool him a life. If he dikin't look

tened out the paper and pored over it

He looked up

much but today if unpleasant menapkind of magic was in good memory

his breast pocket folding it, he heirling

You had a

He noticed "Both of us played original Who was more dahonest?

"Because we had to see how well you What about my son?" I saked

"I quatactee be will I can show you

be better rust knowing he'll be fine and

vetually nothing can touch you. For me

the day I discovered Willy was hearing an affair) that I had to 'szy' something about it. As an old woman I d mva it to Just recently, now that the children you clight know They aren't important

that's readed to say something in writman said. I bolieved him after seeing





want to see the photograph of him? I was tempted but finally said no

"Just tell me if he'll be a pilot captern of a Concorde flying the Pare-to-

Are Still Heroes "He held up the draw-

What about my getting divorced?"

Yes I do

He took another piece of folded pa-

smoothed the paper on Thursday

stern Aide cross hatch depth One pear

"There wil be a d

as correng for you

loved him enough. But beades loving day he surroed, pulled his no card, but nothing heppened. How long ago was

That familiar gray and red cover. I remembered the day i'd bought it and ary can ihanded the sales girt was glasm-

In the lwing room agtas. Thanded my

What will happen to the children?

"You can change that

'How? How can I change all these things? What no you mean?

officer. They were only creat artists

"Yes Draw a picture of a pear then intryour phrase Titat is what makes you

We keep our word. Your son will still into your romacer life until you will realuse over more than now you volbeen suf-

"And if I give you the book and do your drawings?

Mr Thursday emled for the brat time "I can thonastly answer that because drawings. Mrs Becker Because gvon God appearit know or remember any greezive amnesia. He longets things, to put it simply. The only way we can get tain music, road passages from books.

> know We are recording change and go away Right now they re small thros-optan smells done quickly When Ho

'For the real of your He if you you to do a drawing. Like the patr to I wore to show you which of your work is-transpendent you wouldn't under-

You can do things we can't and

failing memory. When His memory is gooe, frem will be nothing left."

more A few days after I last met with Thursday I had a strange expension there that source me on the place. I was place behind the counter. Too closely 1 my diawings. Thursday and bere are a disappear former OO





ARTICLE BY BRODERICK

With massive sinom engines driving its paddle wheels on each side. the ultramodern Central its way through anything the Adamtic could muster, even a humeane. mistics, even a humikane. Or so its captern, Wilsern Herndon, thought it was the kind of tubre that led to one of the work seataring disasters in hestory, an event to rival the strising of the Takes. The speedy, teamous Central America ON LAND AND AT SEA, FORTUNE SEEKERS ARE USING HIGH-TECH TOOLS TO UNLOCK TREASURE CHESTS LIKE THE ONE LOST WHEN THE CENTRAL AMERICA (1973) routinely pled the lucratwo ParamationNew York route, making 43 successful round trips before nothing and on

AMERICA (LIFT) WENT DOWN

while would be its final voyage in September 1857, Onboard were 590 ssengers and crew. including forty-raners, adventurous fortune seekers returning from Cellomin's gold rush. The ship, in fact, carried a cargo of three and a helt loss of gold in the form of bars, freshly minted U.S. currency, and coms cast by private ments. One day out of Heams, the Central enca encountered Aviation disponsion of the leading edge of a humcine And on Saturday evening, Sep-lember 12, the mighty craft lurched three times and then sank 5,000 feet to the conit floor. taking with it 425 peoplo-end all of its pold Mailed clown and walued by weight, that gold would be worth about \$30 million today But the because's true walke is insreassurable Few U.S. government or

prividely struck coins from that period exist in mint condition. And almost no gold bare marked with the assayins'

intents prist from the nineloenth century. For decades dozens of transure hunters. some of them unscruces to separate guilible monly, cleaned to have found the gold laden Central American But this ship's wherenbouts remained a myslery unki Thomas Thompson, an ocean engineer who has conducted studies of deep-one melking, formed the Columbus America Discovery Group to search for the Central America. Researching the historical record and celoulating the effects of wind and the Thomoson and his project loans narrowed the target area. over a fist, lostaroloss section of the continental shell known as Blake Firdge, 250 milcs off the

Wewing the treasure on color monitors and using a joystick to maneuver the submersible make operating a remote-control vehicle skin to playing a video game?







coast of South Carolina, "We collected and computer entatives isoms of eyewithers accounts of the Castra' Arrenouts late hours imade by sourcers and observers of the entang to classrate the pectative/source/the sing. Thomson says. Then we used advanced acces requirement is used have able to the character and the single to classrate the reserves and no source to classrate the memory and individual to class.

Bound only the Central America and other celetrated traits, making and other celetrated traits, making of anyone with risk compares that making of anyone with risk compares that making of anyone that course of tuding works, house body hursters celled for making or making of the risk of agging up of and content of the risk of the risk of accelerated by the dividenment and commercial analobility of host of tuding the making integrable to first and accelera-

Top def Equiprovaly are gold street from the correl Arrest owner notaceable in adubtery silptone compound and them Minut From the Sold or minutes the solution of Artschild 3500 million transmer and adubter a gold paller and the solution transmer and adubter a gold paller and the transmer and adubter a gold paller and the Equipart Merganical the Nation's and decamated estands in themes gold and and decamated estands in the Nation's According decamated estands in the Nation's According decamated estands in the Nation's According part adubted to National adubter of gold and and decamated estands in the National page According part adubted to National adubter of Solaries (Solaries (Solaries



beety had has heatables been out of mach. "High sch is the waie of the luture in treasure heating" doctars and trepplayed burnam Matheman auftor of the interaction of the Asocha. "Since talls, when Matheman the Asocha. "Sackad do Asocha, them has been a gardam legit braved in the scherplay But it sck the Castan America to show what can entit be done.

 trai of a \$14.7 million cache of pold and silver supposedly stathed in Virginale Blue Ridge Mourtains.

In other landlocked humborships of the elements dup to the treatment in presentor in an use of the treatment in presentor in an use the second of the control of the second of the second the second of the based of the second of the the second of the second of the

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Therefore, a net hard, of consume, cate and anched to foroance, cate and anched to other and the second second second second and the second second second second second memory with the second second second second memory with the second secon

"1 don't think any of our people are gready," says Grag Sterrim octounder of Sechask Deep Coren Technology, also response for recently finding a lab magement of the second statement of a OMM

second singuesek formise of the least coast of Rockin, Recompany satisficludes a termer decice, a real status and the second s

And at least the well-hranced protosend ashages, like throe associated well-Churbus Amenoar Seethank, cliphy an increasing sentituity beard the need to preserve the historical and mclassingcial means of like infrad-sis well as make a proti. "We don't think of concluse to themsure human," says therdisector. "We under think of descise." Also under the option-

Some people end up in bad shape, like speed freaks They just burn out If you're motivated by greed, you take shortcuts in your rush to find gold and end up going broke.

ic relationship between and teackagy and commercial sativage and we to doing things that are in no way related to prot, late developing the first enchance/opcel standards for deepwater incovery."

The Carried Americanes is no more latence droper time no previou allow origing that Columbus America's methods for the Columbus America's not preservation of antifactunal previous from the control to the score with an extension of antifactuanitian conditioned, the search of the sector of the control of the sector of the control of the thomas and a conditioned. The search of the sub columna of protecting the thomas with a polyment that compares that control control of the Columbus that control of the sector of the control of the control of the Columbus that control of the control of the control of the Columbus that control of the c

Like reverbauching buccaneers, tociay streasure hunters employ sophescated geer originally developed for mitery applications or oil and gas exploration. And tests proton magnetimeters solescan sonie subbottoe prailers ground panetariang radar (GPR), and other lingh-tesh testure hunting

weapons, as well as ROVs, can sport procetags ranging from thousands to miltions of dollars

Terthered by faserptic russ to a mosacro-vision, and ROV a blocking in obmach vision, and ROV a blocking in obmach length rubble as array of servitive development in subjects and subject have development by applicable of the exemption and subjects and applicable area and rubble, and subjects and applicable area and a possible to inflavoure means and autors applicable to inflavoure ROV and to praying a vision part of the subject of the area of the applicable ball the own montheres to experimention and and and an area of the Ballion over the applicable of the Ballion of the applicable of the Ballion of the applicable of the applicable of the applicable of the Ballion of the applicable of the applicable of the applicable of the Ballion of the applicable of the applicab

Bucking and modeling there are 1607 kines the Columbus Americanassages have space at a diminish of an indication at a 20 microsoft and so all mode to the Company have so all mode to the Company have part Lusake university, and protecting and protong a search with. Bucket has an elegand for thong encounting and protong a search with. Bucket has an elegand for thong encounting the search of the search with a term and to adapt the whole to the resolution area do adapt the whole to the analogies of the respective.

Therepresent while initiality as program to becament the Central Amotocousts on over teacements in new perospandor in recordmany and ment semicles, willowing and and the semicless and the semicless of and the wildowing and the world's "A Marco semicless and ment leads to advice a semicless and ment working to advice the semicless table wildowing to advice the semicless bases means the to advice the semicle advices the there is no advice the leads bases of the set of the set of the set of the share even on things as back on while the set of the set of the set of the set of the share even on things as back on while the set of the set of the set of the share even on things as back on the the share even on things as back on the share set of the set of the share even of the set of the share set of the set of the share set of the

Exploring the airs, the result/thms have discovered incit biological case, man observed borner stretch of overting the prival for eventrals, supports acad-borning olama called phyloidade borning data courses used in cancer resource threat borner of the case of borner of the resource of the case of the case of the resource of the case of the case of the resource of the case of the case of the resource of the case of the case of the resource of the case of the case of the resource of the case of the case of the case of the resource of the case of the case of the case of the resource of the case of the case of the case of the resource of the case of the case of the case of the resource of the case of the case of the case of the resource of the case of the case of the case of the resource of the case of the case of the case of the case of the resource of the case of the case of the case of the resource of the case of the case of the case of the resource of the case of the case of the case of the case of the resource of the case of the case of the case of the case of the resource of the case of the case of the case of the case of the resource of the case of the case of the case of the case of the resource of the case of the case of the case of the case of the resource of the case ports Charles Herdendorf. Otro State University professor ementus of acoiogy and geology, who heads the Columbus Anatics documentation program

Like ROMs, sobscers soon will subbedra partner sink site Decars and an other partner site site Decars and are hards. There are a site site site site site site are hards. There are a site site site site site or makes (bury, a work in late hards) and and the hard site site site site site and the site site site site site site and the site site site site site and the site site site site site and the site site site site site and the site site site site and the site site site and the site site site and the site and the

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Sidescan sonar fans signals across

the cost flox, swepping the evidence of three dimensional objects. Cognitify diversional the cost of the cost of the scale lists and the been mounted on unminimate as well as memorial submitter lists, and in some instances, divers have camedhen/cheis unter More commany, altima-aria-al-alta-the loss loss pado-shaped scenner, or "fish" is toward being toward being a research versel.

Weather searching the seas or the high serars, however most protestoral breakers experiment of the protestoral breakers experiments and the searching and the searching of the searching of the searching of the searching of the tabular searching of the searching of the breakers (searching of the searching of

No cell trock who bened the testing, estimated to be worth 5000 million But located some 12 million testing and adult of basics on the Suxemen River, the life has been documented as more accompassing a partie camp fritomition in ad Nexy and Treativity Department that the design metagenth control to be address to the source that the design metagenth control to came of basics and the locate Segurargatore. Can support throat Segurargatore. Can support throat Segurargatore.



Bity Bowlegs But he lears more toward hencies that Jean Lafate buside the lonchests said to contain gold coins and barn as well as silver times. Namenous attracts to the the testater over the last 100 years have failed. And with the ressure implicated as the motivation in at leas one suicide as well as mass poinsoning, aston, and an attempted borthing, follows claims the Fowler's Bluft sith is curred.

A tite netteen the sectors previous end of the netteen sectors and the sectors of the sectors of the sectors and the sectors of the sectors o

Excession of the site, however, is todous and postmoted. On all least one occasion, other and his learn sport a full day digging out the pit. Alterword their measurements in dicated they ware, in last, two fact higher than when they began. They have since placed a ubeloadtendem inside the dug-out pit to hold back the audit, unitable to of

The dam, however, blocks of P1 morememory, D1 mapping Makeng manageweeks, water from the Sciences as sectors where the science of the sectors where the science of the sectors where the science of the consistency of galakased. We here new in the process of waterproving a shipergram box? 20 mays, there is a shipergram box? 20 mays. Others will be down who the data's watery detrinwith waterbights and the remitmod (20 m. etc. boxing box one of the chemical sciences).

Used in Trainare expeditions accord the works, provide controllation trainarmonatorial control and the properties of the properties of objects as much as 100 final bottom to be existing control and bottom to the the memory of the properties of the properties of the existing of the properties of the properties of the existing of the properties of the properties of the existing of the properties of the properties of the existing of the properties of the existing before the properties of the properties of the properties of the existing before the properties of the properties of the properties of the existing before the properties of th

Many lost or buried treasures are, at least theoretically, within reach. And while there have been serveral reach dis-

Introducing the 1990 Chrysler LeBaron. We've given it a luxurious new interior, a smooth V-6 engine, and Ultradrive, the world's most advanced automatic transmission, all under one roof...

Of B2F144 ag array of the second s

"Although public and privite corporations seek the huge treasures in the occars, most of them don't want to deal with the various state lows and protricted agreements with property owners, not to mention the hand work involved in the search lot leaser threasures." One says "So there will always be maaningtal projects for individuals to underlake. And wach especificien is unique."

The electropic of liabled towes can always be verified in did severpopues, hitory books, and with other archival tecarrh, as well as eyestmice reports. Philip Hugo's Tholing Theseure/Arconda's for search, provider around adkoo on investing in expedience and also the magazines are devolded to teace interaction. Advance Advance and other magazines are devolded to teacewhere the Advance Advance Advance and other magazines are devolded to teacewhere and Advance Advance and Advance Table Macan California

Not every hord, however, is a socialul. As Mell Fahre colourines, these will federa Archinoamiseptiterous asachregistro fra Account and the asacher employed solences notes, several asac long saterit for the Acount Fahre employed solences notes, several subments, including a god donotor fact he dosigned hinted subments, including a long discussion fact he dosigned hinted (sole that a melg by of the sate cologo metales) and the several metales and the several ment found it," he admits Eventually he instructively returned to the site where he would strike it not, proving that no matter how well equipped you ere, luck plant a role in success.

User no, the Abstrate separatives has not prevention Fairs from using about to gravement Fairs from using about to apprecision Fairs from using about sensity suggety hands on Bauts R. New ensating suggety hands in Bauts R. New metaged and nation Bauts R. New in the acity (1026). Blacking the transmission in the acity (1026). Blacking the acity and sophistication for the second acids and and sophistication metal for lower the table Balget Manifer (Explorations My 1967). These has conducted as and sophistication metal deviced. Figums that the second sector acids and sophistication metal deviced. The proceedings of the lower file and to be obstrated and the lower file proceedings and the lower file the lower file lower file proceedings and the lower file proceedings an

As sector follogy helps unlock more and membra haven in closes to request an uneral area on a collision course with archaoologists and mailtime historians. In whice could become a modern day we selection and the particular backward by take unlearning and the archao control of the selection and the selection and the selection believe that product archaeo copets the selection and the selection and thermation. seeking only what is commarcially valuable and ignoring noncommercial antfacts." Can seek

The power 2 locary for Hencord Archaesing, in the Line barrend the prime retains of points to a mend the prime transmission of the second second second prime they wheth seaks of Walfleet, Mauschaetester, they service and the mension of the second second second retains and the second second second retains and the second second second retains and the second second

According to Paul Johnston charman of the ascessive adversive board for underwater archaeology. The society rejected Harmition's assentific paper on the Mayolah because, in Johnston's words. "professional archaeology and commerorie explosition are incomosible."

But Hamiton contends that the unmate deposition of the antifacts is imainvent. "The only issue should be the quaity of the analysis of the date multireporting," the attys, adding that the socety is rejusted of the scientific papers will laby make it difficult to place. Whydehartilacts in a reputable museum.

Congress has telpolided to the cose for present regulation of metitime searches and in 1988 passed the Abandoned Stipuexed. Act which gives notvidual states control over salvage optidays in their waters. The law also the quirau the National Park. Service to come up with next of pacifiants for regulating the recovery of histore the various But the other work of the conditariant to follow the guidal rise currentin is dual form.

Infrequenchistic compression y using regenerational island for isonic notional al watching, lakote, and insequible them. The statist of between wheads obtained is percent of the value of any discoursy within is coasistic watching and the facer thouting the memory is the state of Forces tood to columities within weak that falls and regulations could writigate hold the commencial indicative watching and inserve Anomalow watching.

Some treasure hurters and antheeologists portry their opponential as highminded externate. "They have this leftwing photosphy that if its old end in the ground, it belongs to everybody" one beasure hurter wome.

But Gordon White, a codirector of East Carolina University's Martime Hatory and Underwater Archaeology pro-



pum, mantans that he's seen no windence of any commercial salvage opention that has yolded significant inchanological information, whistewir file clasms of the perforguna. Solit spoken and thoughtul, Watts below theorem selener characterunation of their opponents, but he does autoon to a hardine publice about theseum huring

Hereenty cover as an includ data of the physica assignment to work with treasure hutches in Key Veen Hell Westh. "DataU, wijk waakkage," he ongo, "them his mereer been an instance when the refer and wage and pool and antheology have coautitud on the same propert. Antheology metrosas amount of line of the 6% in metrosas amount of line of the 6% in metrosas amount of line of the 6% in media to proclase recent and a feature media to proclase recent and a feature media to proclase recent and a feature them a taxeford in the collaboration for the 6% in

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Thesame function argue that theosense of histories medies reaching on the occent host will be tool forward it assess of histories of the second second and and the second second second second second and to properly handle to take on such a more set to second second second second means theoretical second second to be means that the second second to be means that the second second theoretical second second second team for an extra second seco

The possibility of larged threeworks breads in a subscreen any service. When combrokes is a purpose any service. Much successes of path runs. No ensy, drift put and any service of a 3,000-year-cid varianticity of the service of the path of the and the service of the service of the and the service of the the service of the service of



There Is No Luxury Without Engineering. THE HALL CHARGE

EXPLORATIONS

CONTINUED PROMIPHON 32

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In Grah versional Breaks, briansand Care she perceptions This particularly remarkable since in to book the Sacred Executioner Maccaby colicacido that Cain was indeed the hote in the first only and became the patient of restlangth - maccares, and patientets. Genesis 4 IN-22 bits up: Tahf is supprising to a discussioners to scenaone who was banched to scenar for the markability. in Maccoloy's reconstruction of Genesias Carris killing of his biother was not a senseless homocic but the printeval sacritos that secured the critication of the haman race innutway. Cos reached the same conclusion as Maccoby.

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Coo may also be stronge and temple but has the and imphs contrast a basic enlightes nable with a basic strang relagions, from Hautam to Judden and Channel and a basic stranger and detanong the and basics Phenese. Coo seems to age we concept at the type of that our good health and lotter a ste sometimes bought if only symbolicative with the lood of sametice DO

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Computer graphics let scientists transform mathematics into imagies of a thought-provoking universe



Although these seasthels don't Pickover, who has been dabcostein the ocean's cost, they bing in computer graphics for might hold the secret to how the past two years. spicals form. Swept ashore Graphic artists and soce-From the deep take access, fasts will benefit from Pri-hens spirite and calaboration of a dogst. These comple-test barrageness are recreased on the dogst. These comple-test barrageness are recreased on the dogst. These comple-ties are spirite and the dogst. These completes are spirite and the help from CIDINP Dros-control over starts and the dogst on the dogst on the control over starts and the dogst on the dogst a problem integration with a solicital cale dogst drawn is proper article to the accession of the dogst one dogst an instance on exit, any and advect and advectance dogst an instance on exit, any and advectance dogst one work an instance on exit, any and advectance dogst one and the dogst and the dogst on exit and the dogst one dogst one advectance dogst one and the dogst one and the dogst one advectance dogst one advectanc

from the deep blue screen, lists will benefit from Pick-

COMPUTER ART BY CLIFFORD PICKOVER









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How you recognize your mother's face is a mystery, but cell by cell this Nobel-winning neurobiologist is revealing the way the brain transforms raw patterns of light and dark into visions of sunsets, Picassos, and oncoming trains

INTERVIEW



young, low-paid Johns Hopkans In the late Febrer, David Hubel grass seed. But they couldn't kerrot one spring. Hubel me- of all bolgov-the brain-by with a pair of kitchen sciesors

more patient person than most of us, more patient frem most neurobiologists. At the time of his lawn scissoring, he and his partner. Toroten Wesel, had just embarked on a far more daunting protect trying to fourth out this organization the most complicated structure with a tiny electrode Hubel tal-David Hubel (pronounced) or compared the task to cul-HYCO-bis) is obviously a long diawn with a rail science

PHOTOGRAPHS BY JAY MAISEL



Cartain myths have grown up in the field of neurobiology such as the often-repeated myth that you use only tan percent of your brain. That is probably utter nonsense. The myth is based mostly on rat research.® For their efforts, which spervised two decacles, Hubel and Wesel earried a share of this 1981 Nobel prize in physiology or medicine.

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Were the articl' Weise began studying vision in to idia of politring the collection of the view is being and the transmission which collecting with the transmission the transmission and the transmission the beam wave much back consistent the beam wave much back consistent at thm, it says it transmission and the transmission and the transmission and the transmission of the transmission back of the transmission and the collecting wave, indiministion and political transmission the transmission and political transmission. Boost of information and political transmission the transmission and political transmission. The transmission and political transmission the transmission and political transmission. There is and the constrainty back transmission. There is and the constrainty back transmission.

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Hubel and Weeal's findings were dramatic and unsepected "Up until them," says Charlies Michael, a mauntabologist at Yale Michael School, "people fait had cells along the visual pathway just responded to dob and spoke and dough nuts of light." Hubel and Wesel's renuts of light." Hubel and Wesel's research revolutionized our view of how the brain is organized to process signate sent to it from the way. Their work set of a scramble to find similar patterns of cells organized in columns disewhere in the sensory optice.

Holde and Wesel's work also led drimotily to a care to extension and of the result is a care to extension and of the teven expension to the care, in place al birth, they descrived develop entry an teagamen begins to back of the work! As a result, declors new entrywe extension from a backy care without while birth. Weining for serveral years, as eye sugener had tarditionally down, leade to permanent withering of connections in the contex.

Born of American parents, Hubel oney up in Montreal. His father was a in chemistry himself. Stuffing a small properties in the street outside. A visit versity he became intrigued by the medical world. So he decided to enroll in dissected a log. Ahir medical school ington DC, at Welter Read Anny Insttute of Posearch. Moving to Johns Wesel a nerve of Seeden Thry betheir vision experiments. Throughout the Socies and Serverties the two were cozypersion the visual contex. By the time of Roger Spony, of spld-brain fame, they had begun to pursue separate studies University With his ourrent partner. Mancurvet Lovingetorin. Hubel continues prob-

A dail, term mon with unity gray hear and highly Grawhen cover, likeling in way, hear names is unoposed to latence and highly Grawhen cover, likeling in the other are a gray of brains mean startist. He took up the title outry gray Bearteen and non-starting data in guilding to works displayed lower a colors, molsed outry in the server process the too workshold in the server process the too heart of the other process the too heart of the server process the too resolution of the other process the other process the other resolution of the other process the other process the other res chine. Hubel continues to fashion many of his own cell-probing lools

Courtoous to the point of seeming bashful, Hubel struck interviewer Doug Sowart as being more lightheemed and internal han you might expect a hobel laureals to be Appointments were some immer hand to amange, Hubel all occasionally alwaps lain to resover from all right experiments.

Otto: What is the relation of the visual portex to the rest of the brain?

Habit The entries than is about the table of the bound of the bound of the bound of the the bound of the boun

Linder any given square millimotor of ocnex are eccentring like one hundred housead cells. The osits are my, the size of blood cells, but different in shape hourons have a kind of phyberthaped body from which extends one main cover liber, or accr. Statismaturterminon how of the usits, and many of dotter frees called densities that the dotter frees called densities that the main statismature of the statismature be on hardward with the statismature be on the statismature be on the statismature restrict the statismature be on the statismature in the new complexities the statismature be needed to be statismature be on the statismature be complexities the statismature be on the statismature be s

Oranit What is the function of the primary visual contex?

Habel in a global sense it's concerned with vision, of course it's via demage a few mitimatical of it some part of your visual verificial of the some part of your visual verificial demages and the some one waters something of to one side, you wont are it. The bits you your visual wont is enapped out on the visual contors in a prepared out on the visual contors in a prepared out on the visual con-

Own: Areas of the refina are mailshed with areas of the visual portex?

Hubel: Yes, the rotina really belongs in the brain, but it's part of grown out into the oper as it were. The visual science is projected of fam, the relies has these layers of cells. The fait, the rodia and



cores, and a signal or not depending on whether light this them. The notators hand their information to the nast layer, whose calls synapse with the layar abler that, so that any one cell supbles many cells in the next layer.

The information deterily usit proceed undigested from one stage to the mail. At each shape cartain filings are entracted from the visual information, and other things are thrown away. One human can respond to tight retring them. Exceeding the mail of the shape of the process that a the heart of the whole question. How do were?

Orms. What first got you interested in the cuestion?

Habel, After, thereing my needen y my mencloga i found mysell part of the obetors ciral in 1961. I was lucky enough tog is trivities freed, where some of the beer people in analony and physiology where all the early mesench, but had some where it was territyrine them and had never done any mesench, but had some where it was people and adventations in my supplement, so I enough up working where the but balanced any single-

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Omnit What were you trying to learn about sleep?

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Ower What did you know than about how the brain makes sense of visual information it receives from outside?

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Onve Just as one's brien is more engaged by a typed sheet of paper than a blank one, even though the blank sheet a brahter?

So by the time you get to the optic nerve, the significance of the information the cells correcy has changed Although the role and corbs are concorrectioned surgery with light the cells of the optic nerve also concerned with more completeled things. And at each lived of the system after that, information about each liftle part of the visual world aborg operated on and threatformation is the instance of that transformation is

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SKOTHERINENUSTRIESTEL, NAGOYAL

We await the appearance of the Marta Lights. teardrop-shaped flames that may suddenly pop into view.

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advises our guide James Looker, a commons and ongtime student of the lights Crocker along with usertwean Martin Halantape has spont more than 100 hours burveying the sumounding horizon. On three logaratie costestors there disjondor has paid off

A red light bloks on and off leaving Depter unsurimed. That's a beginner subthing tower "he says pering through binoculars. Just to the whild the red beone while large lisuscerely bursts follow. And that a what most people see " Crocker warms, automobile feedgint. Through binoculars the single light acon warwise the two the bright because the single light acon they have peoplement free states and Martia, a social 20 millions aver-

A few old-tenters from the area recall seeing the lights ong before the commit of electric gover and automobiles Halte Stillwalt, ninety-one, a former justice of the searce from nearby Alprine, speed the lights as early as (916), while teaching octool in Preside and parking a The allocation water back where body farchings by bookings of the second second parameter probabily and the people of Marks are invested by the source in sources and the legitile image. In Lass year and the second second human second body above and Unacover Mysteries brought humanism of seconderes. The diverse brought humanism arrows Marks Lights Research And there is even taked as the Last List Theory can be bund.

But to hear the looks of Naria table to the mysopy of tholights as uppermost in their minds. I would oldnessly be discoported if anyone finally decided what they were aske chamble of commence president and reality Canoen Reinbox of the lobality of the lather system mysory.

Rentrop may not have to worry As we drive away a light glows in the reariview mirror, then facts. With the windows rolled down, the only sound pre-king the stende is that of the West Taxas wind DENNIS STACK

pretol to ward off Perceno Valids border raiders II looked like a campfire that travels says 551 well Back then we simply called them phose lights

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As a bonus, chaos theory may also ofter answers to the big questions that terment scientists and numerics alike. To wit, what is the source of norrel idens? Now can we have free with and affilible skews to scientific laws that govom the behavior of all matter?

Traditied by mark autoremy, soamtais invaries enrinais teodotol to involuing a little manimetie our heads—a homerculu—who was issuing all the orders. In a less than satisfying revises i placed the homerculus with an automation—a medices brain that functions likely our devikapp computer, description likely our devikapp computer, description (but sofer elusive) program. Uniortanalaly, subernatoris do not make very good faile thinkers.

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Takes is a character parallel in the brein Hupo holdis up two EEG othats One has large, smoothy rounded wwws hell are warry spaced. The other is wagby ine that rises and fails haphapardity two sharp poels and waleys. The smooth segular waves, fluthis out, www.second.off on an elepicetor having assoure. The impute segality we produced by the hand is a failed to opport.

On learning that beautifully symmetrupal waves could rack the body in vio Ion sparms. Also Garthiel of UCLA's department of knowskidge was struck with anidae. An expant is movement deorders, Garthiel had long puzzlektowe was debited primons that palque victem of stocke and Parkinson's disease. Hewendeets, Could an affiction of the netwoor, system surfar to epilepty be at the root of their problems?

Portugativ to Centriasi, paivra administra bulCA to tessata ion toutney generatoromyograma (DMS)- approximative occurs for mechanism phaselectual appendiative testar tour mouthing the vision of the test back ream, "the results" also I decaded to take advantage of them." A centrall back ream, "the results" also I decaded to take advantage of them." A centrall haven there resource contrand the haven there are become a central patients demantative the contral central patients demantative the central central central patients demantative the central central

"Contrary to initiation," says Clarinisal,

To the utter dismay of scientists, what had begun as a jumble of trajectories—the disorder overyone feared eventually assumed a form, a phosty geometry called a strange attractor.

You need desynchronized firing of nerve cells in order to achieve amouth movement." He draws an analogy to a plateon of solders mosting a bridge. To prevent destructive vitications from collapsing the bridge, the sold ors brask rams.

Notifier applies not tensors would applie to how any whyre in common tensors to how any work of the second second second second second tensors of appliesters. The A is a of hashed water and the construction of the second second construction of the second second construction of the second second second second is a sec stats " No matter what's happening around them, they feel deependent--

A healthy, set mind, Elkala ti ny east-haugetal, anonononoid—offi aster antigotal, anonononoid—offi edmastere antigotate bidendel is bandedmasteres. There is acrea hydroid tym order for the body is function cornectly tobe in sync, but it not too rigtily looked in to these ingrithms of the person easted one versality and adapt with "the concludes.

After namping out with bog lockers at a public park is son Joer, cellborne in the early Eightnes psychiatral Rey King began to assess that Johnsphronta, might also endowe its withins in a mightmatch cycle. After agit net absorbing water by the After agit net absorbing water by the answer the book park cellborn and the book park cellborn and an answer resonver of untraged exclusion renser.

Based one ap and back, will want the one of the latter of the mark that and the latter of the latter of the mark that and the provide the second one approximation of the second one of the sec

Would chaote fluctuators in depemano levels restore normal behavior? In the instance, King paulions, they might make the schizophratik even worse. The model 'he says, 'Indeplets that the brane is heathest when departine remains at the same level."

Beine dyskanskie fan heweidige of beine dyskanskie fan en mehenskie op nochte and suggesting novel angenochte is preventing of at klast redissanskie andersteiner see artiff in the ment a sketneal ad vir blofer an ment haa en operpiel sketzer. Here is anderge andersteine associated with the EFD signal—s sign har millioned netres as beginnal to sign har millioned netres as beginnal to sign har millioned ne-

If the same observation holds up for humans, it could serve as an advance

wathing to doctors that modifications are anded in the patent's treatment rec. man "Rather than watting for you to - man busy to a lifetime Rapp is branchhave another seizure to determine d'the I don't like the way your brain waves look lockey Lefa increase the douade

Still more kulturistic applications of chaon theory have captured his fertile mapmation. The mathematicizes open others plogst-farmer is also an avalion enthuseast, which undoubtedly mapired the Rapp says, 'to develop an EEG-moniviolent manauvers that fonce blood out of his brain " Just before failing unconmet The information would then be releved to an onboard computer, which plane to reduce the gravitational forces

Santiarly, Rapp can envisage electrode-studded headware for air traffic controllers, nuclear plant operators, rawhose unwavering vigilance is critical to the safety of a large sector of the pubthe FEG might be used as a measure of marial alwores.

As the mathematics of nonlinear the names advances. Rapp anticipates that computers will be able to detect ancreasingly subtle changes in brain sistes, learning, desage, and song Of course, austwhere this will each can be discount only in vary is cutting, like the of these advances, in Rapp's opinion, will he helder techniques for disprovence produce a confusing amay of symptoms

that surgecel patients remain in a safe lapsing into a come but still far from a tents to begin to stir on the operating While during surgery, promoting the anadditional dose of anesthetic 1

On the therapeutic front, he predicts the same technology could become an indispensable tool in speeding the dethat readons the normal electrical patterns. of the brain would be obvious cand-

dates for further testing and reinement "

inc off from his EEG studies to undertake a bold new milistive-arguably hemost ambritous yet. He's swarching for undwisi theorems that underlie psychomysterious rite of passage

control of therapy just as though it were used to track the verbal exchanges beapists 'Basically' he explains, 'we're trying to discover if there are malfromatical patterna-such as strange attracsome patterns of interaction more likely

GII you think humans have a monopoly Dri creatwity consider cloud formations or the whork and vortices that spring up spontaneously around a rock in a stream

faunter fedirets with conjunat equations to together," he says "Were dealing get to also function as a mathematioan

therapy's unifying principles are psychin Orienseburg, New York, Although grand theory, which they then attempt to test. Page and his collaborators "Theyne building the world's first paychoscope," observes Balph Abraham amatematican and crieturian chaos ma at Santa Cruz.

teen becars by vicisoteons thereby we-15-second segments and scoted on such terrs as Who is taking? For how lives sexual references? Is the material derived from intellectualization or fenta-

What can they see through the lens of their psychoscope? The picture is far therapist appear to function as a unit, with repetitive patients of pommunical ing over successive sessions. There we've carried the analysis further

tractor is a peculiar trend in the length of time each apeaker taks in succes mints, who use a to describe market to psycholineary or applies more broad

Dianare immediate relevance to pra chotherspy, according to Lange is the now characters in reaction, patients although ducing disturbing images from disearce, fantasios, and other ' uncon-

school dialogue between ex different receipton was higher in ellimitances beanalysts have a chead of unconscious.

In one dustrative case a young wom an admitted to ber theyapet that she fare basized about cloing physical harm to har mother. He responded with a metorical question. "You've built a different life to yourself, haven't you?

The women paused for several secords, her train of thought internation but soon brought the conversation back to her obsession with harring her mother. She noted that her father, in her mather before abandoring the famblude toward sexual intimacy-' view ing it almost as rape."

I quess your failter leaving you was

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from Napoleon Russaurte's decision to unsade front in Hatory could have diverged protoundly from its actual course Action should have diverged protoundly from its actual course within should have caught Association in scale to Epyte distoyed from and issolvemently preserved the Republic Asposion and diatory

The tangenty of these strangles was dark to its creators, its fend intervention of the second second of a paragine of individual efforts for excepts, the presidence of Second Secon

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a grace loss, "the basic pit knoppetion This are in the patient of knoppetion of knoppetion before images but help to the first innerthinalization glopes. Consequently, a loss - inducting of there is not an inconsequence deviating of there is not an interaction and and a second second in the state of the loss of the second second the interaction target was also also be set of the second second second second the interaction comparison of the second second the interaction of the second second second thes interaction of the second second second the interaction of the second second second second the interaction of the second second second second the interaction of the second second second second second the interaction of the second second second second the interaction of the second second second second second the interaction of the second second second second second the interaction of the second second second second second the interaction of the second second second second second second second second second the interaction of the second second

Paradoxocaly, it is more often the pabent who initiatios dynamic change clureo theorem, page Lance, "because so

long as he or she terrane lacked in terrane lacked in thera's not much chance of working to a new way, of thinking it is only by looking at unconscious meaning, by oping through that shorn of othos, that a potenti can meaning at a highor lived of orlier

In addition to those Androps, Rep has uncovend a subtrippition of indicitination of indicitination of the subtripping index incontinues and became appailorit separatoly by threa theraparts with different sitiotemps to the

The pertern of interaction basaceally conforms to the doctimet philoceptry of the paracuter therapist."

sing Figs In classical psychomylapia, to warrow, increases execution of the solarity of usaged matter-weaks in solarity dramatic matter-weaks in solarity therapia. A communication integration of the matter in which allowers and dramatics integration warrow allowers and dramatics paid which the through gas. "Investing and the through gas," investing and the through gas, "Investmentation from parts losses from apbenerables as increasive to solarity and persistive to the special of the special of the and and a collower two." Matter as we toophy control and the special of th

As the researchers acknowledge they have basily begun to extract mean-

Ing icos the mountees of transcribed back of hereary satisfics. Yoy emply, if is a lock satisfic to collect data that to make scene of the transper, in keeping with their disclimit philosophy, howeves the inseaschers are conditiont that suit of the unity disorder, it higher fed or other will entropy, part of philosophy for more affective methods of psychotratization entrevention.

Aside from the practical benefits of spoking nonlinear formulas to the brain and behavior, there are denormous asothetic rewards. Or to otherm Rapo, who has been spending much of his spare time transforming his own brain waves into control social/or into the waves into control social/or into the second social socia which legaps training, of course A loss facto a daydeerming, for instance— Repp likems the imusics of his small to a degrany da, a holion aborgenit limits were barright with a stack. When he eningenis inmatal antimetrie, easing the strategie attractor on His wides mortifies to esplote in all antimetries, easing the creater of the strategies of the strategies of the strategies attractor on His wides mortifies and the strategies attractor on the strategies attractor on His wides mortifies attractor of the strategies of the creater of the strategies of the strategies of the strategies attractor of the strategies of the close strategies of the strategi

Thana's presently e long chiley between the recording of his brain waves and

ar into his art chao-

the time lag by dovision a system of

"Then 111 get to

hear and see the

maltime" produc-

stros Bapp 'in

I'll be able to respond to eil the sounds and visual mages my mind un produced in an endless loop of madeby."

he adds. "Just

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nantoutres"



etange ethnisiske had melamophone socarding to the monet ethnis. Childo he has even ensurial dir ito multimoties effects through the addition of music esal backdrop to the pelasing ethnis abackdrop to the pelasing ethnis music on the compaties scores. Ris genumay the music of the benispheres, for heaps ocreates the frequencies. At his bran's electrical waves directly into sound waves.

"Basically," explains Rapp, "I begin by wing up my brain and then run the EEG output through a digital convertier that oimultaneously turns the signal into strange attractors that can be both seen and heard."

What does an abstract geometric structure sound He? It depends on He eyes light up that these of a preacher implanting his congregation to merved atthe impacts of salvador. To freup, one suspects, the creation of nonlinear rat forms is much more than a hobby. If a is manascandoral experience—a religion

Proceedings and grad, response of God in the symmetries and harmoness around term—In the basical direction such precomments as electrically and monetarity. The says. "I don't doe the ornple patimes underlying nature's complexity as ovidence of God. I balance that is God. To behical astimpting differtor, spring to the own "GOD.

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after telong LSD, but we haven't establisted it in nouroteological studies." save psychetric department. For some peopla, Freedman suspects, "perceptual the roting actually sees-may be dehis to know seeing it as a door " he saws

and positivumate stress violine, who otoo suffer from fisshbacks in either case, a traumetic event or powerful drug expensionce becomes seared into the nervous system This is important, key Bear, professor of psychiatry at the Unweatly of Massechapets Medical School

Many LSD patients describe or dike petseeing the pattern of blood veesals in the orbital Bene start The settle rormalia 96 CMNI



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screens out fixed images in other cases mages called phosphenes by touching see intages on the right eye. The only way the can happen is by going through the laster A potential CNS site is the futured from of the westel system in the their arrus. Abraham speculates that the uncondual colored, doughruffike images decontract by contribut search

A tent celled mentilied electroet tons " He and coleagues at the Boston to proclass an electrical "topography" of pretty tetry going on in the temporal Iotaas, sava Apreham

Animals that hown had their letticorial Many processing areas in the cortex, the teconomi jobes are involved in the ritegration of multiple sensory functions such

as velon, hearing, and louch, as well as ders of post-LSD patients may be caused chokositEd th Kaplan Toov may iterally lan says "LSD may lower the threshold of neurona in the temporal lobes, so that an auditory signal could activate naighboring visual neurons, or vice versa

The temporal lobes are the cortise vicania of temporal lobo opleasy, who other have visual and auchlory hallucimore striking according to Bear 'An USD or turn to chalosophical and releases speculation, or become paraneet or haposesual-trate commonly associated

More than half of Abrahams published turbermore ituffer from panic disorder the unwracting the inhibitory mechanom of the brain people may be more erretors such as foar" he save Abrethese people?--- a head invery in child hood, a scar in the temporal locars a family history of mental diness-" that council by USC' But after boarno the Lets call a scade a scade By the time they get to me they ve been through the coars or don't know what to do about

John Doe is a case in point Before coming Abroham he was degrosed as astranoteans and siven Thorazine Since they dave me Thomar a every thirts fees been plowing yollow," Doe says intronome. Benaodiazopines, a cluss of bangulates including Velum, are now harn save. There is life after fleet/blacks

flashbackers can learn to tare out un-They took LSD and unleatened someevancies" truch as stroke patients regain

"These may be a purpose to this." Doe adds "As with every oddball thing, it might lend to understanding DO



CONTINUED FROM FALSE TR

what you learn when you sludy individual cells

Tomestor thridag test this use amerging yoo alway, throdag we dollar use to wood in that connection in hose days. Katter's payment in naited tal of nacceptive/solg or their threaway part bogon to thil how the whole threameth work.

Ormy What did you tackle then at Weltor Beert?

Hebel is second to microard from the occtax scall with microelectrodes in care to the were seen and microeleg ascund ratinar than anotherated To Go Bitsl, I hed to design a device to hold free electrode that occurd be matalied on the animativi south These were annother of hold the ter filesci, and I hed to keep going towich the results. Issuing, you'll have to the microelest, source, "This soury, I designed this words, you'll have to brance at "which therefold to make them whet the microelest and the microelest the source of the words, you'll have to be must. After a few months, it signed up, for a night course in machining to learn to work the latin myself. I sinushed an order for a liathe pack the head of the lab who thought it was a solupit idea Scencerist later, he charged har mind it was soluting to sain cells responding to vision in the same armsal that was string three loading around.

that no size what made the cells negood I transport the minimal to staff and function on points by reasonating it with local of blogt to system a cell an point for a few minutes. They searched to any register the staff and pathing the search of the shall reaced by purning. Cerest When did you learn once you had the observation?

high it is the when to show a flashgiven to be avained to be, the cost of the dirich resort at AL Clearly, light along dirich resort to the index direct and them says to got those only in brack of along a single start and the same the index direct and the transmission of the regord well to an object that index in other properties that and any only index that any along the same that may not be regord well to an object that index in other any along any corner for Start in the ways corner field. The any start corner field in any start corner field in the best well well to the any start corner field.



Geeni How did your collaboration with Wesel begin?

Hable 1 mixes emangements to etern work at Johns Hopkins, it the list of Weman Nourclassite, who was and is one of the leading central innovations system physiologists in the world. His lab was standed 1 So Sinve Kuffer suggested 1 come to his taken and work with Toman word to our delight we could still insise the out delight we could still insise.

Cenny You could get the brain cells to fire by shrang a light on an artifial's rives while it was out cold?

Haai Yoo, Boonae Yoo annothed burned out to here an edited of the Induway Ve payhold here electronic for word in the term of the annothed of the Indution here can share an electronic of an electronic sectory of the annothed of the Indua coal. The happened introversite word word ago on to the next. We diverse the term and the Indution and the Indu- term of the Indudot on the Indu- term of the Indution and the Indution and the Indu- term of the Indution and the Indution and the Indu- term of the Indution of the Indution of the Indu- term of the Indution of the Indution of the Indu- term of the Indution of the Indution of the Indu- term of the Indution of the Indution of the Indu- term of the Indution of the Indution of the Indu- term of the Indution of the Indution of the Indu- term of the Indution of the Indu-

Devis Whet kinds of accidents?

Hade if the data ones, spot energines, the data of the data ones, spot energines, the energines is also one operative the strength ones in the data of the data of

We ensure realized that the line worked only when the object west at a periodiar coestation—writed, bottom buy or battage. I we lind the side of a different angle, the cell durit respond at pathway, these cells in the primery valual contexteen to forger information (petimistration of the primery valual contexteen to forger information (petimistration) and buy the of a become stratigities.

Cestr These calls were turned on only by knos of a certain bit?

Hubel Yes. Let's say we got a good reapproach with a varied line. If we titled



the line slightly so that it was along and server of obc/, the response would be much werker. Thit more then that and woll get to response at all, but other cells in the immediate neighborhood would response to the titled the but not the original cell frash neighborhood to would response to the titled the but not dell Trotton and I had no way of nealuring whether this was a common tining or such a cell wise a rank time a see of oreful with every possible land of response proceeds.

Own: Ware they scattered in a sea of dissemilar neighbors?

Habel No. In an expense of on the water of the electronic lawthese, at about a left the electronic starthese, at about a left weight any starthese, at about a left is call has way. To cut amounting, we you're a central the starthese at the origination of the starthese at the and none were out or piece. We call were and were out or piece. We call then own the house without guilting of our atells, and at the end when we possed these tendent these avents?

To give you an idea of how for a bidranges in his environment the charges in his events was and the charges in his events and the charges in the promoved softways through near the main of cartes, cell share cell, you'd individual the way enough to clock. Over the dation from the one enough to gain you all the way enough the clock. Over the dation from the one enough to gain you all the days around the clock. Over the days the same taken have been delined to the same taken have oblight that allered to care charge of the way harrow-should a same taken of a way harrow-should a same taken of a same harder wide.

Over This means each point on the telmais handled by a cluster of many celuros in the vesal contex?

Hubel: Yee, If you push an electrode straight down through the cottox, studying one cell after another for mayboone handned cells, all the cells are concorned with the same small section of the retion.

Onvol What things are cells of one perticular column sensitive to?

Habit Naybe for or two vencibles. Any yes go a simple down through the onetes, the into orientation stays to same, buildown calls negrenal beilt to block and others to a white inves. Coor and movement are observing the same throws into a simple mass. Coor same movement are observing the need between observing them statescrup, ones. Some call are even have yabors how for saway the object is, while others don't give two tools.

There's also a prenamenen called ocuter dominance. Most cells respond to both ways bub better to one eye than the other. In a given column, if the test cell prefers the right eye, so will all the cells as you go down. As you more across the certox parallel to the surface, you have an atternation—left yee. Ingit eve.



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Our laded has advays lacked coloc daring to when lack David sold whicksy in the crocking to when bottle was more important than when it his bottle was more important than when were on it. And we sail as you that a our Tennessee dealify volday I your instructs less in a tudy smooth signed instructs less in a tudy smooth signed the first will accound labels, well, the first will accound labels, well.

SMOOTH SIPPIN' TENNESSEE WHISKEY

Towards Minkey in 66-575 should be solver (20-20 yout) + Socialed and Social by Just General Deptility: Ion Waters: Proprietor Rode 1 Lynchburg (Fug 361) Sociesant (1311) Int, mpt—roughly every ted millimate. If you could see a magnified version of the context from above according to which ever the calls respond to, it would bolk a bit fike a contrar's ellipse. Owner What are the most complex cells in a column?

Hatel The "and stopped" of Forona of those calls the longer he into we propoped on a screen. The batter is inpaced on a screen. The batter is inthe scaling we have a screen screen with safety we the call screen scale with safety we the a longer to screen or a part of a carve in general. He is inthe year of the manace system. The more comparison of throng set (ridevaluacets) become fusient about the kinds a struct is the screen screen scale.

Owny What's the most complex shape you've gotien a particular mouron to respond strongly to?

Hable is the primary vessel control, a dioritien onting hable if however, pacpa have described cells contain the primary westar consols that respond only if you present the energial with a face. Not every cover agrees about the webley of cells response to a lease but if it proteby control. It is inty attribut occurred in one very small part of your primary we all centry, you'ld be bland in the part of your you all but it. A strate in the familor you are wear fact. A strate in the family operation, when include a swall area. that a maybe the size of a large postago stamp. will not make you blind anywhere. But will infimitely equivable of a size processing the size of the size of the size processing of the size of the size of the size processing of the size of the size of the size size of the size units and happens to hree the offer of the size o

GenerArght there be superspecialized neurons for down in the visual pathway tratifice only when people see their molier's face?

Hubble Trapposition, but it don't introve any body which there tank. In this participly, we valid when you does your mohin's task me not approximation for their tasks they're aseng care of space by paceof the brain whene oats are space about of the brain whene oats are space about tasks, no one knows. For one thing when you knock out a call or even a small group, or oats anywhene in the brain, you don't knock out any angle before.

Ornet: How did you present the images to your lab pate?

Hubel Torsten and Hed decided early on that it would be much earlier to propot the images on some sort of science than to project them detectly arises the interina with the optimal moscole. The first daywed dit has we becugh in some bed ansate from home and dispaid them over poses in the calling so that the place looked like a circus. Vernen Mourtcastle come by for a with-the must have been appelled. Later we got an ordinary move screen.

Once What did you try projecting-any images of barking dogs?

Habit No. altrough we do try a leveratbal frenge, Laver on with norkwy a syllow Kodak film box with net writing proclosed frantisses, mestar. Wila alko usiad a cover of Casevopolitika magazano. In fact, we worked with everyiniting we could get our handle on, bacause in some call negated with everyiniting we could get our handle on, bacause in ubox of halways their loss for that call, se was it secondaries more complexited.

To pan down exectly what it was could sale hours, monthly, and even years. What the stroke objected though we found over and over again that is an even fring the marks to some simulaa, what it sale into its ryregion of the foldsh boot of Contropolets cover was a time segment that happened to be in the right coercision of the coltro colls weren't really respending to anythms hitsmale build were large



all intents and purposes, a straight line over a short distance. This was a surpriorig result one that robody had predicted until we stand putting electrodes into the visual contex.

Ormst What was your lab at Johns Hopkins like in those days?

Hubet It was wonderfull a denzy, dark dicenvolace in the basement of the Wimar inatitute of Ophthalmology, about klteen feet souare. I had my desk in another soom. That was our total domain It was far from an more tower. In the patient department. So to get to our lab. we had to go by long rows of patients have it was an obsolutely wonderful ing we'd get helisitiy tinus. Often things would be badly wrong. On days when be last hour after hour of fighting, trying amazingly often -- felt we'd learned sometoday This is one of the few helds where you're not on a team of erableen people Usually it's just two, three people at the most You can still do real sciey If a pleasure often denied scien-

Ones What was it like tearring with Wasel for twenty years?

Habit terms, we learned to contrustdate to easily that were now, we know whit the others strateging without samp meny words. We termily have to tend to be one it was a semaiting was obstout to one it was a semaiting was obtout to one it was available was obtout to one it was available date of the easient seatch to oblighted have detected and highly begind and highly began to highly begind and highly

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Omst Has that been controversial?

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Center Tell us about the "blobs" and col-

Hubel We ve found that there are little areas we call "blobs." We called them that because the word is graphic, legal mate and seems to smoy our corrections days used days on the cortex, they in poles-dotted throughout about the line millinear equal and they go down through the cortex like pegs of these brokes are hall of oalls instal of which seems to be conclimed with oal or , whoreas mod of the cells bed with form and movement A number of other baceba are also foreing at the sms.

Marge Livergetime and Li a prevent, al anea, nost to the primary visual octal anea, nost to the primary visual octtions. This seems to rever three parallel spatems chan is revolved with octor, and other with stereosophic depth protochtion and maximized ania a third with insign and dom why principles of the fard stage and nosity for save which for familiary apply to other parts of the octors as well.

Cress Has your work halped us understand halucinations?

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Ormil Have animal rights protestors caused problems for you?

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A FOLKLORE QUIZ

Many urban legends and to weld-insort that you've probably other beaut them or can come up with that learnuls endings yourself. What are the purch links to these modern billibility? The assess follow the quit.

BULL Dri April 16 1987. Brig Martin, the intermittent New York Yarlisean man ages, was a guest on Late Ages Win David Letterman He told of a prantic that Moximy Manto and Whitey Fred had befored of http: when the three of them avails and isoda he seek, worthe and isoda he seek, worthe owner to parmittee to be the owner to parmittee to be an add part the seek of an add part to be and add to be parmittee to be and add to be part to the seek of the seek of the best in the top add to be and the top add to the seek of the top and the top add the set of the add top add to be add to be add to be add the set of the add top add to be add the set of the add top add to be add to be add top add to be add to be

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the problem is, what does the officier tel her?

5 TINKL EXAM A studont in a large college class derrygmts the prolesser is drechen that everyone stop working on the final example, working on the final example, working on the stage showed to drop his solent bookkit on top of the others. The professor parties it back. Tabloyou to stop whing when the back rang Decause you dieosyeculyoo table dataset arriends. "Sit don't you prowieho Lam?

Not to be introduced, the teacher replice, "No and furthermore I don't care " Having beautilities what

ANSWERS FOLKLORE

 BULL When Mantle saw the goat out in a hold he pot out of the car and, anisanding to be singry at he farmer, took he rifle and hold the animal cleard Martin claimed that he her got he own gun and shot two of the rancher's cowe When he found out it was all a pile, he had to pay SPD to antiaste form

Variations on this take of shooting the built have seen traced back to 1945 2 DOG. As the woman sees to issue, the hostess lays, "Don't forget to deal unau clien with unau

The woman says "I trought it was your dog!

Brumerral has togod the sorry back as far as a 1934 children's book, Ersiy Chilas, but a venari apposta in IG-Pegras rocart, book who Got Astations Chilas? Ecoantrosy and Genus at the Instate for Antennod Study (Addion-Wealey, 1997)

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3 NOTE Thave just dented your lender The people watching me think I'm writing my name and address on this paper, but the red. Securi.

4 BLRNY 'A numerics call' says the cop. Their permitbat ched yesterday and they bused it. Some sold wendo dag it up and put it back in its cage. Brunkend says this socy that apmission in a Wart Bergin. Ornn is the last word in the puzzle over scientific terms

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5 EXAM Good I says the student He styp he blue book into the center of the stack of test booklets and walks out of the isom

ANSWERS LAST MONTHS SYMBOLS PLIZZLE

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DOWN, NOT OUT Disperseble plastic cantalaces are a bilght on the earth. How

on the carth, New you can return in a time when keed, recently a certainer, wearthin certainer, wearthin merrin by rediling Decemp 64 measure plantic hattice using the creacentrate centrics of in the paper pathoge (pipt), Cortect Procter 8 Gendels, Cleatent, Oth (213) 183-1900.

SAVE THE DINOSAURS

The local percise per is over these in the four space in the localities by collecting Weich's discover jers (cheres). The compasses (cheres), the compasses (between). The compasses (cheres), the com

LIGHT LUGGAGE

Associan Things and two year forcedo paper has plain a flans, kensping, er tahls lange (right), fries 1816 for a non-langur lange, 3145 for a flote madel, 323 for a tahls fight, 324 for a tahls fight, 325 f



NORD

By Tom Naughton

They verbear out payriding and spraying Windex is one another's faces in one another's faces "It makes us plute," Dan says "You mean blotto?" I ask "No, plute. Like the planet. The atmosphere up then near tranks us goor?"

Don's Langeling so hand, he has to finetri the story in short bursts. 'So wa minummas the spacehtic ho in 1995 Soon with Clamed' he continues, elegening has hand agained the winn of my chair. Medd War One ace and we burgs a few animers in the Bermusta's Inaglei'

"And some guy and his whe in a Phote Dub!" Make shorts. "Every terre we do that we lay odds: on hose short I's show up in the Enclarer."

"On on Genetics" Law They suit look at mail a cave in ny entoamount to the speaking appin. "I cant before you're adding lae blan. Tos'av varaled me what mwybe a dozen brnos smoet i wrote you and bad you i wei on to you'r And you're alwlegis seamed loo o spanuad and senses. Now here you ad badying i waggeing archard ity appartment, haading abnes like old tob befortes. Waat over?

Den explains that they've all been out joyncling and spraving Works in one another's loces. 'It makes us nailly pluts' he says

You mean blotto?

"No pluto Like the planat. The atmost phone there makes us gooly."

And when they do get plain, they turn who the wickedest practical jokana this table of the Miley Way. If the evening t storage are any indication

"When I lists anywest harst," Maline says, "my favoria targets were inter kids fol assar their math homework spati borton school or mgb as on their new Essler shoes. All mght I'd go into their closels and woode here closten all them?

Den and Jawan performed adult victime * Buil adult use a tot of integritation book them. Toon ways, " For State one of isach sock from some guyre dreeter drawers. Or on oxid ingrites for yards the bigriteries off stores woman and wrop her husband in them."

Jasson points to the "Tou wear fun. Whenever you had an overright guest. Id socal to white you stept and splits you harroad all critics with SM Of."

"Thianka:" I Say searching in visit Ka s adappy relort "T thought you wave here to possbuct expensionals."

No for that weld use a more moleging species Like dolphins, Maini says

The true has apparently began when bas suggested pulling preview on scientists indee supposedly skeptical creations. He liked tweeting anthropiccosts and architecturals ball.

Tussed to derrop a Durich of Booters tools and salbots and relignus whileds toom sity Egypt. Then bury fram near a dig is Polynesia," to sales. Titu wouldn't believe how many Ph D cardictass manifier deserblank truth."

Manu chimes in About once a year we break out the Windex, witch

The As Expedition, and set crack up." By now Don is codding off in Window," Jason smorts. He end Mano takis turte opcaying resch-oliaid faces, leves prompt a new book of laughing with davest about New Agen. Apparently the New Age insolement has inspired some of them boot pages.

Jason clame to tis misponiatal to all the broatwarta over the histotecht modelwy photomenon. "A branch of polarisation were skickling monitored howe skickling monitored a monitory on Weld, one day instroed a monitory on the one instruction waining his sevent polatase. Then I worth hopping from name to set and and the table at the differ monitory to do 1.1 Book them forever monitory to do 1.1 Book them forever

Mercia tercetar parte a versa di Pigtorona arti operante locale. Trava locali arti operante locale. Trava versa artico posi alla concentra en locale apuatori nel locali en locale artico localizzazione locale di artico localizzazione locale apuatori los travos ante locali concentra e locale locali locale locali e locale locali concentra e locale locali locale locali locale locali e locale locali locale locale locali locale locale locali locale lo

West there is not over the bots part, dialor uses. We stid David and hundred and hundred of others that they belong to a choice group of these function of thousand spinlawly advanced poople, and other the Articiting space and thousand to which there of thos paper unit it a ones, then biting them back to repopution a new advanced Aral Bots backers using the provider Aral Bots backers using the provider Aral Bots backs to repopuation and Arad Bots backs using the spin and the spi

Look away In his Windox experime Jacon had apprendly terpitien that Sour years ago, hai kati me'i was one of the chosen 300,000-New I reekm IT withwith here the besth taking out. I may even read Ne realands.

Don wakes up 1 can tail the Wincex a wearing off "Hes write taking too much." he says, noticing taking the

Held end up in a rubber toom,"

"On on Generals" I for agen. This know here, angh, Bal known Bight, Henni Hall angens, No ofer workit believe Had overschere bein knog annon un ihr mense kann Styvers, Oterming Hen know Alsouch yould herek that of the mikines (a produce key watch of heree Andy Walamso, Christman especialis, a few more watch wave staded that Earth christmi coada over theya all that Makeri – and all three Math. 20

Turn Maugneon is & Chicago aptor wito well, but anothed buying a care of Worder.