Intuição e decisão

Intuition and decision-making

O livro "Aquém e Além do Cérebro" contém as actas do 8º Simpósio da Fundação Bial, realizado na Casa do Médico, de 7 a 10 de Abril de 2010, tendo como membros da Comissão Organizadora os Senhores Professores Fernando Lopes da Silva, Alexandre Castro-Caldas, Caroline Watt, Dick Bierman, Mário Simões e Rui Mota Cardoso.
Os textos estão disponíveis em www.bial.com.

The book "Behind and Beyond the Brain" includes the texts of the Bial Foundation's 8th Symposium, held at Casa do Médico, from the 7th to the 10th April 2010, having as members of its Organizing Committee the following Professors: Fernando Lopes da Silva, Alexandre Castro-Caldas, Caroline Watt, Dick Bierman, Mário Simões and Rui Mota Cardoso.
The texts are available at www.bial.com.

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SESSÃO DE ABERTURA
OPENING SESSION

DISCURSO DO PRESIDENTE DA FUNDAÇÃO BIAL

Luís Portela

Senhor Secretário de Estado da Energia e da Inovação, Professor Carlos Zorrinho, Senhor Secretário de Estado Adjunto e da Saúde, Dr. Manuel Pizarro, Senhor representante do Conselho de Reitores das Universidades Portuguesas e Reitor da Universidade do Porto, Professor José Carlos Marques dos Santos, Senhor Bastonário da Ordem dos Médicos, Dr. Pedro Nunes, Senhor Bastonário da Ordem dos Farmacêuticos, Professor Carlos Maurício Barbosa, Senhor Bastonário da Ordem dos Médicos Dentistas, Dr. Orlando Monteiro da Silva, Senhor Presidente da Comissão Organizadora do Simpósio, Professor Fernando Lopes da Silva, demais autoridades presentes, minhas Senhoras e meus Senhores.

Gostaria de começar por lhes manifestar a minha alegria em os receber aqui, nas instalações da Ordem dos Médicos, para o 8º Simpósio "Aquém e Além do Cérebro". Sejam bem-vindos. Obrigado a todos pela vossa presença.

Quando uma empresa assume uma certa dimensão, vai tendo - em minha opinião - uma crescente obrigação de servir a sociedade não só com bons produtos e bons serviços, mas também solidarizando-se num apoio mecenático verdadeiramente desinteressado.

Para mim a vida flui num "toma lá, dá cá" ou, se preferirem, numa partilha constante entre tudo e todos. E quando a vida nos dá a responsabilidade, embora temporária, de gerir um património mais avultado, há que ter o cuidado de não o espartilhar, antes o fazer fluir de forma responsável, solidária, sustentável e desenvolvimentista.

Por isso, quando os Laboratórios Bial assumiram a liderança da indústria farmacêutica portuguesa, nos preocupámos em partilhar com a sociedade as mais-valias adquiridas. E fizemo-lo apoiando a investigação em Saúde, por ser esta a nossa área de actividade e por termos decidido que a inovação era uma das nossas linhas estratégicas de desenvolvimento.

A primeira actividade da Fundação foi o Prémio Bial, criado em 1984, e actualmente um dos maiores prémios pecuniários na área da Saúde em

toda a Europa. Com ele pretendemos incentivar os bons profissionais do sector a publicarem o produto das suas investigações e a divulgá-lo, nomeadamente com a edição de duas das obras premiadas, que são distribuídas gratuitamente à classe médica.

Seguiram-se, a partir de 1994, as Bolsas de Investigação Bial, procurando apoiar a investigação no homem saudável - para não haver confusão com os interesses dos Laboratórios Bial -, investigação essa em áreas não muito apoiadas, de grande potencial de desenvolvimento e com interesse para um melhor enquadramento dos seres humanos perante si próprios, perante a humanidade e perante o Universo: a Psicofisiologia e a Parapsicologia.

Os simpósios "Aquém e Além do Cérebro", que se iniciaram em 1996, procuram colocar em diálogo aberto e frutuoso os investigadores mais conservadores com os investigadores mais atrevidos dessas áreas, o que terá sido feito de uma forma pioneira. Mas estes simpósios também procuram ser um espaço de reflexão e de discussão entre todos os bolseiros da Fundação Bial e os profissionais de Saúde em geral, bem como um momento de apresentação pública dos resultados da investigação realizada nos projectos por nós apoiados.

Bial é hoje uma empresa farmacêutica inovadora, que comercializa medicamentos em mais de 40 países, investindo anualmente em investigação e desenvolvimento cerca de 22% do seu volume de vendas. Estamos satisfeitos porque a definição estratégica que nos orientou - embora de grande dificuldade de concretização e de grande risco - foi bem sucedida.

O primeiro medicamento de raiz e patente portuguesas - o antiepiléptico Zebinix - iniciou em Outubro passado a sua comercialização na Alemanha, está agora à venda em oito países europeus e deverá estar em todo o mundo até ao final de 2011. E, felizmente, Bial possui mais cinco novos produtos patenteados e que poderão vir a ser lançados até 2020 ou 2021.

Porém, se estamos satisfeitos com a nossa aposta na investigação própria, também estamos satisfeitos por estarmos a apoiar a investigação em Saúde, através da Fundação Bial, para onde a empresa canaliza anualmente um pouco menos de 0,5% do seu volume de negócios. Sabemos que também aqui - sobretudo na investigação em Psicofisiologia e Parapsicologia - são necessárias muita paciência e muita persistência até se obterem resultados significativos.

De 1994 até hoje apoiámos 324 projectos, envolvendo 1047 investigadores de 24 países diferentes. Muitos desses nossos bolseiros estão presentes neste simpósio, apresentando os resultados do seu trabalho: 42 posters, com resultados definitivos, estão em exibição na galeria ao lado deste salão e foram seleccionados para serem apresentados oralmente 12 desses trabalhos. A generalidade dos resultados, provisórios ou definitivos, poderá também ser consultada na nossa página da internet, através dos computadores disponíveis para esse efeito na referida galeria.

Mas continuamos a desejar ser úteis à humanidade, apoiando e incentivando estas áreas, de forma a podermos ver cada vez mais esclarecidas as funções dos milhões de neurónios alojados no nosso sistema nervoso central e cada vez mais esclarecidos os fenómenos descritos desde a Antiguidade e classificados na área da Parapsicologia. Não defendemos esta ou aquela teoria, não procuramos demonstrar como falsa ou como verdadeira esta ou aquela posição, apenas desejamos o esclarecimento capaz de desmascarar fantasias, mas também eventualmente capaz de permitir ao homem um melhor aproveitamento de todas as suas potencialidades. Acreditamos, sinceramente, que só a Verdade fará o homem livre.

Por tudo isso, tenho o gosto de lhes anunciar que a Fundação Bial irá abrir ainda este mês um novo pacote de bolsas de investigação científica, nos mesmos moldes dos anteriores. Cada projecto em Psicofisiologia ou Parapsicologia poderá durar um a três anos e ser apoiado até 50 mil euros. O concurso encerrará em 31 de Agosto próximo futuro.

Estando a Fundação a dar continuidade às nossas actividades, gostaria, contudo, de lhes dizer que é possível que algumas alterações, sobretudo qualitativas, venham a acontecer, em sequência das recentes alterações nos nossos órgãos dirigentes. O Senhor Professor Nuno Grande - que aqui homenageámos há dois anos - e o Senhor Professor António Simões Lopes, que durante muitos anos serviram dedicada e desinteressadamente esta Fundação, ambos em representação do Conselho de Reitores das Universidade Portuguesas, o primeiro como vogal do Conselho de Administração e o segundo como Presidente do Conselho Fiscal, chegaram ao fim dos seus mandatos por limite de idade. O Professor Nuno Grande - ausente por problemas de saúde - continua a colaborar com a Fundação Bial como Assessor da Administração.

Por indicação do Conselho de Reitores, o novo presidente do nosso

Conselho Fiscal é o Senhor Professor Júlio Pedrosa de Jesus e a nova vogal do Conselho de Administração é a Senhora Professora Maria de Sousa. Aos dois - e em especial à Professora Maria de Sousa a quem me ligam laços de forte amizade de muitos anos - as nossas boas-vindas. Muito obrigado pela vossa disponibilidade para colaborarem com a Fundação Bial.

A Professora Maria de Sousa, aliás, começou a sua relação com a Fundação Bial da melhor maneira, em 1994, ganhando o Prémio Bial de Medicina. Depois foi membro do Júri várias vezes e também Presidente de um dos Júris.

Resta-me agradecer à Comissão Organizadora deste 8º Simpósio todo o trabalho de organização ao longo do último ano e meio e aos palestrantes convidados terem acedido a aqui estarem connosco durante os próximos dias, partilhando os vossos conhecimentos. Oxalá estes sejam dias muito bem passados, com conferências de alto nível, esclarecedoras trocas de impressões, frutuosos contactos e uma grande harmonia entre todos.

Acreditando que só a Verdade fará o homem livre, deixo aqui os meus votos de que durante os próximos dias nos aproximemos todos mais um pouco da Verdade. E que saibamos criar condições para, ao longo dos próximos anos, darmos um contributo lúcido e esclarecedor, quer sob o ponto de vista material, quer sob a perspectiva espiritual, para que a Verdade triunfe.

Bem hajam pela vossa presença.

Muito obrigado pela vossa atenção.

DISCURSO DO PRESIDENTE DA COMISSÃO ORGANIZADORA

Fernando Lopes da Silva

First I would like to compliment the table here and the public for attending this session.

I am speaking on behalf of the Symposium's Committee that was in charge of organizing this symposium, as well as some of the previous ones - this is the 8th symposium of Bial. I think that everybody will know now, these symposia are dedicated to all issues that may be relevant for brain functions, in a very wide general sense. And this 8th symposium continues the tradition of the previous symposia on themes that previously were dealt with like memory, consciousness, emotions, and now intuition and decision-making.

This is an opportunity that was started, as Dr. Luís Portela said in the beginning, as an opportunity for those people who get fellowships from the Bial Foundation to present their work and has continued as a mixture of a scientific symposia about these themes together with the presentations of the fellows, either by oral presentations or by poster presentations, and now this format has been quite successful in the last years.

This time the theme of intuition and decision-making was chosen and this theme is very challenging and, as Dr. Portela said, there are some people that are more conservative and some people that are more daring, and I suppose this is a theme that is for daring people and not for people who are not dared to get into this realm of the processes in the brain that are related to decision-making in all its different facades.

I can summarize the symposium by saying that we are faced with a number of questions on this realm. And considering the different days that we will have ahead, I could summarize the questions that we are going to deal with in five questions: the first one is are all decisions the result of conscious reasoning or are they also automatic processes that mediate conscious decision-making or intuition; the second one is what are the mechanisms in the brain that are responsible for taking decisions and how can we find them, what are the methods that one can use to find

them; the third question is are there also physiological variables outside the brain that may influence decisions and how do they interact with the brain processes; the fourth is are there anomalous experiences that may condition taking decisions that may underline some form of intuition; the fifth is what is the role of decision-making in social life, and for this we have three different domains; we will talk about business, we will talk about clinical dimension and diagnosis, and we will talk about teaching, and particularly teaching of mathematics and what is the role of intuition in this.

So, I do hope that in the coming days we will have the opportunity to get discussions on these questions, although probably we do not get the definite answers, but if we have not the definite answers, this will keep us busy for the rest of the time.

Thank you very much.

DISCURSO DO BASTONÁRIO DA ORDEM DOS MÉDICOS

Pedro Nunes

Senhor Secretário de Estado da Energia e da Inovação, Senhor Secretário de Estado Adjunto e da Saúde, Senhor Reitor da Universidade do Porto, Senhor Professor Fernando Lopes da Silva, Senhor Bastonário da Ordem dos Farmacêuticos, Senhor Presidente da Secção Regional do Norte da Ordem dos Médicos, ilustres convidados, e permita-me Doutor Luís Portela que o tenha deixado para o fim porque gostava de me dirigir a si, nesta última vez que, na qualidade de Bastonário, terei a oportunidade de estar presente neste simpósio onde estive sempre.

Permita-me que me dirija a si para lhe dizer, em nome dos médicos, o gosto que é tê-lo como um de nós. Apesar de não praticar e de ter feito da sua vida uma outra aventura, é uma referência em Portugal, não é preciso dizer, sabe e muitos o têm dito ultimamente, agora que o êxito é evidente, mas para nós, mesmo quando o êxito não era evidente, a atitude do médico, a atitude de quem persiste, de quem procura investigar, de quem não vive dos subsídios e de quem quer fazer, é uma atitude muito portuguesa, mas é uma atitude que temos que reconhecer nos portugueses que ainda a mantêm. E é esta a postura que nós médicos gostamos de ver e de apreciar e é por isso que é sempre com muito gosto que eu estou presente e que o cumprimento, mais uma vez, e todos nós vemos os seus êxitos e o êxito da empresa que construiu e da Fundação, que tanto tem apoiado a investigação em Portugal e os médicos portugueses que investigam.

Para a Ordem dos Médicos nada há mais a dizer. É este o sentir e este o exemplo que nós procuramos que todos os médicos dêem, no seu trabalho persistente, no seu trabalho do dia-a-dia, na procura de cada vez melhores caminhos, melhores soluções para os nossos doentes, sem hesitar perante os tempos, porque muitas vezes os tempos aconselham-nos a outras posturas, a outros confortos, mas é este desconforto de não se aceitar as coisas como são e de procurar ir mais além que deve caracterizar os médicos. Nós, na Ordem, temos procurado fazê-lo; penso que, no futuro, quem aqui estiver, o continuará também a fazer. Neste

último tempo também desenvolvemos um projecto de apoio aos países onde se fala português por esse mundo fora, projecto esse que hoje tem o reconhecimento internacional, uma coisa que começou também muito pequenina, tem hoje apoios e realidades que todos os anos, cada vez mais, vão tendo desenvolvimento, e portanto é neste sentido - nunca estar contente no ponto em que se está e querer ir sempre mais além - que os médicos se revêem e que a Fundação Bial e o Doutor Luís Portela nos têm ensinado a caminhar.

Muito obrigado por tudo o que tem feito por nós e os meus respeitos.

DISCURSO DO REITOR DA UNIVERSIDADE DO PORTO

José Carlos Marques dos Santos

Senhor Presidente da Fundação Bial e da Bial, caros membros da mesa, Senhora Vereadora e Senhor Vereador da Câmara Municipal do Porto, Senhor Bastonário da Ordem dos Farmacêuticos, Senhor Vice-Reitor da Universidade do Porto, minhas Senhoras e meus Senhores.

Estou aqui em representação do Conselho de Reitores das Universidades, a pedido do seu Presidente, Professor António Rendas, Reitor da Universidade Nova de Lisboa, que impossibilitado de estar presente, o que lamenta profundamente, me pediu para aqui o representar, o que faço com muito gosto.

Essencialmente para felicitar a Fundação Bial e a empresa Bial, e em particular o Doutor Luís Portela, por mais esta organização do 8º Simpósio "Aquém e Além do Cérebro", em duas áreas – a Parapsicologia e a Psicofisiologia – pouco comuns de vermos apoiadas. Mas, não é de admirar porque o Doutor Luís Portela e a Bial fazem coisas pouco comuns desde há muito tempo.

Lançaram o Prémio Bial, prémio extraordinário, há mais de vinte anos, que era na altura, creio que o segundo prémio de ciência em Portugal, pouco comum haver esse prémio. Depois lançou as bolsas Bial, numa área que também não havia igual, pouco comum. Tem uma empresa que se lançou em investigação, investindo fortemente em investigação, pouco comum em Portugal nas nossas empresas. Lançou o primeiro medicamento português, tão pouco comum que é o primeiro que aparece. De facto estamos habituados a uma actuação pouco comum da Bial e daí a minha grande satisfação de estar aqui presente hoje para testemunhar o nosso apreço, das universidades portuguesas, por esta empresa e pelo seu líder que tem, de facto, feito por Portugal muito, tem seguido o caminho da investigação, que andamos todos a pregar há muitos anos que é o caminho que precisamos em Portugal que as empresas trilhem e que não se limitem a copiar tecnologias que importam. Arriscou, conseguiu e está agora a mostrar resultados, mostra que é possível fazer e que a co-

laboração com as universidades, portuguesas e estrangeiras, uma vez que o mundo hoje é global, é fundamental, é importante para que as empresas tenham sucesso. E é também um exemplo concreto, também pouco comum, de cooperação com as universidades portuguesas que tem sido extremamente frutuosa.

E é de facto esta admiração que nós gostaríamos aqui de deixar bem presente ao Doutor Luís Portela, e à Bial, por tudo aquilo que tem feito por Portugal, pelas empresas portuguesas, o contributo que tem dado para a mudança de paradigmas, que é possível de facto mudarmos de paradigma, não estarmos constantemente a lamentarmos que temos problemas, que é um país que não se pode desenvolver. Pode, se todos, de facto, apostarmos e tivermos coragem de apostar, como tem apostado a Bial e o Doutor Luís Portela.

Queríamos dizer que as universidades portuguesas estão extremamente receptivas a fazerem cooperação com as empresas, ansiamos por ter empresas locomotiva, como costumamos dizer em Portugal, que desenvolvam a investigação estratégica, e que não recorram às universidades apenas para resolver problemas de curto prazo, a três meses, a dois meses, e depois dizerem que nós não temos capacidade de resposta; nós não somos empresa de serviços. É este tipo de actividade, este tipo de investigação que nós temos capacidade de fazer, e que nós ansiamos por fazer, são este tipo de empresas que nós, de facto, ansiamos por ver mais multiplicado em Portugal para que a investigação com frutos para a sociedade possa cada vez mais estar presente em Portugal.

As universidades hoje interiorizaram que, para estar completa a sua missão, é necessário contribuir para o progresso da sociedade, da região em que estão, do país em que estão, isto é fundamental, faz parte da sua missão, mas é importante também que as empresas vejam nas universidades parceiros importantes para as ajudar a desenvolverem-se. Nós temos essa disponibilidade e estamos abertos a fazer esse tipo de cooperação e é com muita satisfação, como há pouco disse, que vemos este exemplo da Bial que gostaríamos de ver multiplicado e reproduzido mais em Portugal.

Queria, para finalizar, apenas louvar mais uma vez o Doutor Luís Portela, por tudo o que tem feito pelo país, e hoje também pela Universidade do Porto, dá uma colaboração, uma vez que é o Presidente do Con-

selho Geral da Universidade do Porto, é mais uma coisa pouco comum, é a primeira vez que em Portugal existe este tipo de Governo das Universidades Portuguesas, é portanto mais um exemplo de como ele está sempre na linha da frente e como as universidades estão atentas a quem faz coisas pouco comuns e querem que eles sejam parceiros dessas universidades no avanço que querem praticar nas suas actividades.

O maior louvor pelo que tem feito e as maiores felicidades para a Bial, para continuar nesta senda e ao Doutor Luís Portela também muito obrigado e muitas felicidades.

DISCURSO DO PRESIDENTE DO INSTITUTO DE PSICOLOGIA PARANORMAL DA ARGENTINA

Alejandro Parra

Ladies and gentlemen, Dr. Luís Portela, in the past, Argentina has made great progress in parapsychology, placing itself as the second country in the Americas, after USA, with antecedents in this field. Now the pioneers are gone.

Currently, the Institute of Paranormal Psychology is an education center dedicated to the scientific study of paranormal events. Its focus is on experimental, clinical, and empirical research, plus the collection and publication of case reports dealing with parapsychological experiences.

The Institute has eight active members, most of them psychologists. The members have obtained a dozen grants from the Fundação Bial between the years of 1998 and 2009, which have allowed us to conduct studies of ESP in the ganzfeld, psychometry, psychomanteum, and psychological and personality areas of paranormal experiences. As a consequence of that, we publish in the main psychological and parapsychological journals in English and Spanish, and we attend dozens of scientific conferences and symposiums in many parts of the world.

For example, we also received a grant from the Bial Foundation to carry out a research aimed at recording people's reactions to disturbing psi experiences and to explore their associated emotional processing. This study serve in fruitful ways to many people to understand the paranormal experiences are not "pathological" but normal and they worth to be studied by social scientists and psychotherapists.

For all of that, for your contribution Dr. Portela, in the name of our Institute of Paranormal Psychology in Argentina I give you this recognition (read plaquetta).

DISCURSO DO SECRETÁRIO DE ESTADO ADJUNTO E DA SAÚDE

Manuel Pizarro

Doutor Luís Portela, ilustres membros da mesa, minhas Senhoras e meus Senhores.

Já o disseram outros antes de mim, a Fundação Bial, a Bial - permitam-me que não distingue as duas facetas, a faceta empresarial e a faceta mais de natureza de apoio cívico e de apoio à investigação – a Bial tem um enorme significado no nosso país; enorme significado pelo que faz e enorme significado pelo que simboliza. Pelo que simboliza de aposta na investigação, na inovação, numa atitude construtiva e proactiva em favor do país. E é aliás muito significativo talvez até porque seja raro, pouco frequente como disse o Magnífico Reitor da nossa Universidade do Porto, que nos possamos reunir todos numa sessão no nosso país para elogiar coisas que correm bem e para aspirar a um futuro melhor, em vez da frequente, e excessivamente frequente, ladainha das lamentações que muitas vezes acompanham o nosso quotidiano sem nenhuma vantagem, para o país, e para a nossa felicidade individual.

Nós temos, dá-se o caso, a feliz coincidência, de que esta segunda metade da existência da Bial sob a liderança do Dr. Luís Portela, coincide grosso modo com a democracia portuguesa e coincide com a afirmação do nosso serviço público de saúde. Nós hoje temos um serviço de saúde em Portugal que nos permitiu, em trinta anos, percorrer o caminho que outros tinham percorrido num espaço de tempo muito maior. O exemplo que é comummente dado da mortalidade infantil pode ser acompanhado por muitos outros. Nós percorremos em trinta anos um enorme espaço que nos coloca hoje, em todos os indicadores significativos em matéria de saúde, num plano de aproximação em relação aos melhores indicadores no panorama internacional.

Mas tudo isso não é apenas fruto do serviço de saúde. É fruto de toda a contingência que rodeia o serviço de saúde e é fruto em grande medida também de um conjunto de empresas nas quais, a Bial, tem uma lideran-

ça absoluta. Eu já o disse noutras alturas – isto passou muito despercebido aos portugueses – mas a partir de 2008 nós passamos a exportar em valor mais em medicamentos do que em vinho do Porto. E da liderança de todo este projecto de inovação e de aposta numa nova economia no nosso país estão um conjunto de empresas, mas nesta área, em particular, está a Bial. Isso deve-se muito a esta visão do seu principal dirigente e naturalmente de um conjunto de colaboradores que o acompanham.

É por isso naturalmente que, enquanto membro do Governo com responsabilidades na área da Saúde, eu tenho o maior prazer e a maior honra em associar-me à sessão de abertura deste 8º Simpósio, com o reconhecimento de que esta é mais uma marca daquilo que é o trabalho que a Bial nos tem habituado pela sua qualidade, pelo seu rigor, pela capacidade de levar mais além aquilo que é a nossa perspectiva do conhecimento, acreditando que a partir do conhecimento estará a possibilidade do nosso desenvolvimento enquanto país, e estará a possibilidade da concretização das nossas aspirações enquanto cidadãos deste país.

Eu quero além disso acrescentar que, depois de ter visto que o tema do simpósio é a intuição e a tomada de decisão, me parece particularmente apropriado que um médico emprestado à política venha aqui a este simpósio ver se consigo perceber alguma coisa sobre esse processo de intuição e tomada de decisão que é afinal o maior desafio que todos temos também na nossa vida pessoal.

Doutor Luís Portela, minhas Senhoras e meus Senhores, desejo um belo trabalho neste simpósio e as melhores felicidades para o projecto Bial. Muito obrigado.

DISCURSO DO SECRETÁRIO DE ESTADO DA ENERGIA E DA INOVAÇÃO

Carlos Zorrinho

Senhor Presidente da Fundação Bial, ilustríssimos membros da mesa, minhas Senhoras e meus Senhores.

Foi com um grande júbilo que aqui há umas semanas recebi o convite do Doutor Luís Portela para estar neste seminário. Um júbilo não para vos poder falar, mas um júbilo para vos poder ouvir e para poder aprender. Acho aliás que a decisão imediata de estar presente nesta sessão, teve uma componente racional: a componente de poder homenagear uma grande empresa e uma grande iniciativa, que já vai na sua 8ª edição; mas teve também uma componente emocional - a admiração, respeito e amizade que tenho pelo líder desta iniciativa, o Professor Luís Portela. Teve também algo de intuitivo: algo me diz que esta conferência converge num domínio determinante para as nossas sociedades; ou seja, converge para os novos modelos de abordagem da complexidade, da gestão da complexidade. Gestão da complexidade, numa perspectiva diferente, é aliás o tema a que me dedico nas minhas investigações universitárias, agora muito reduzidas. Agora, quando muito, pratico gestão bem complexa.

Mas nós sabemos que, para quem lidera, existe uma lógica de excelência que implica escolhas racionais e escolhas emocionais. Para Portugal não basta liderar onde já lideramos, nós temos que ir um pouco mais além nalguns sectores; temos que ultrapassar - que é sempre difícil -, mas eu acredito que, para a nossa forma de ser e estar, mais fácil do que simplesmente seguir colado a quem está à frente. E para ultrapassar é preciso juntar um pouquinho mais de risco e, com isso, um pouquinho mais de informação e também um pouquinho mais de intuição. Perdoem-me os especialistas esta incursão por temas que não são da minha especialidade, não sei aliás se são de alguma especialidade, mas queria terminar dizendo-lhes que no meu ponto de vista, a forma de ser e de estar dos portugueses, que acho que devemos estudar aqui também, tem uma tripla dimensão: tem uma lógica racional, tem, mas muitas vezes poluída pela tendência

para encontrar uma boa desculpa, e para aquilo a que o filósofo chama a "não-inscrição". Tem uma componente emocional, e ainda bem que tem, tão forte mas ao mesmo tempo tão bipolar. E tem uma terceira componente, que é a componente intuitiva, criativa, surpreendente. Por isso, eu acho que pôr mais intuição na decisão é parte da solução para Portugal. E é com essa perspectiva que aqui estou: para aprender, para ajudar a disseminar a mensagem.

Que pena só poder estar esta noite. E como só posso estar esta noite, o melhor é calar-me já para desfrutar o prazer – não o "Prazer de Ser", como escreveria o Professor Luís Portela -, mas o prazer de escutar.

Muito obrigado a todos.

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INTUITION AND DECISION-MAKING

Seymour Epstein *

Abstract

Intuition can be explained by the operation of an experiential/intuitive information-processing system, which is an automatic, non-verbal learning system that humans share with other higher-order animals. Humans also operate with a verbal reasoning system, which is the source of their unique and remarkable achievements, but which is too slow and effortful for directing everyday behavior. In contrast, the experiential/intuitive system is a rapid, automatic, empirical learning system that is minimally demanding of cognitive resources and is very well suited for directing everyday behavior. The two systems operate by different rules and have different attributes. By understanding the rules and attributes of the experiential/intuitive system and by being aware of how it operates in oneself, it is possible to learn from it, to train it, and to improve one's decision-making ability.

Intuition and Decision-making

Intuition can be defined as a feeling of knowing without being able to explain how one knows. What makes intuition interesting is that the feeling of knowing is sometimes valid. People actually know without knowing how they know. Where such knowledge comes from is considered by many to be the great mystery of intuition. As will be shown, there is actually nothing mysterious about intuition as it is readily explained by cognitive-experiential self-theory (CEST). According to CEST people operate with two information-processing systems, an experiential/intuitive system, which is an automatic non-verbal learning system that normally operates outside of awareness, and a rational system, which is

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a verbal reasoning system. The experiential/intuitive system in humans is the same system with which higher-order non-human animals have successfully adapted to their environments over millions of years of evolution, although it may be slightly more advanced in humans because of their larger brains.

Evidence of Two Systems

There is support both logically and empirically for two systems that correspond to the experiential/intuitive and rational systems of CEST. Logically, it makes sense from an evolutionary perspective that nature would not give up its hard-won gains that evolved over millions of years. When a new creature emerged that stood erect, had a large brain, and had the capacity for speech, it would make no sense for nature to replace a tried-and-true information-processing system with an untried one. Rather, as is common in the course of evolution, the new was added to the old. This provided the human species with a unique verbal reasoning system in addition to an automatic non-verbal learning system. Thus, on purely logical considerations it is highly likely that humans have two information-processing systems, an older empirical, automatic learning system and a newer verbal reasoning system.

There is also compelling empirical support in everyday life and in research findings for two information-processing systems in humans.

Evidence in everyday life of two systems. It is commonly observed in everyday life that there are two kinds of intelligence, practical intelligence and intellectual intelligence. Everyone knows people who are intellectually highly capable yet cannot solve the simplest practical problem. As far back as ancient Greece, Aristotle observed there are two kinds of intelligence, one based on learning from experience and the other on verbal reasoning (McKeon, 1947). He stated, "While young men become geometricians and mathematicians and wise in matters like these, it is thought that a young man of practical wisdom cannot be found. The cause is that such wisdom is concerned not only with universals but with particulars, which become familiar with experience, but a young man has no experience" (p. 433).

Someone as brilliant as Einstein, who gave sage advice about social

and international problems concerning human welfare, had a married life that was a disaster (Isaacson, 2007). He married a graduate student, Mileva, who was a fellow-student in a prestigious Ph. D. program in physics and mathematics, with whom he had fallen passionately in love. They had a child outside of marriage about whom little is known, but who was probably given up for adoption. Mileva's pregnancy considerably complicated her career, and she failed her doctoral examination and never obtained a Ph. D. degree. After they were married Einstein expected his wife to function as an ordinary housewife and be satisfied with taking care of him. He left her at home when he attended conventions that she would also have enjoyed attending. When she became depressed he said he could not understand why she was unhappy. Einstein was perhaps the most brilliant scientist the world has ever known, yet he was not very intelligent about his marriage.

The existence of two kinds of information-processing is provided not only by two kinds of intelligence, but also by other kinds of evidence in everyday life, including the occurrence of irrational fears. For example, a woman who is terrified by the sight of a mouse knows that she is bigger and stronger than a mouse and that it has more to fear from her that she from it. Yet her intellectual understanding is powerless to allay the automatic assessment she makes that she knows is absurd.

Frequent conflicts between the heart and the head provide additional evidence of two kinds of information-processing, one guided by intellect and the other by emotion. For example, a young woman experiences a conflict between choosing between two suitors, one who makes her laugh and the other whom she regards as more responsible. Whom should she marry? Her decision can determine whether she will have a life-time of happiness or misery.

Superstitions provide further evidence of two different ways of processing information. People who are irrationally superstitious about certain events are usually rational in other ways. Athletes, for example, may wear a particular item of clothing or engage in a simple ritual that they hope will bring them good luck.

Religious beliefs provide perhaps the most impressive evidence of all that people process information with two different systems. People throughout recorded history in all locations have held highly unrealistic

religious beliefs, which they accept as literal truths despite regarding similar beliefs in other religions as myths.

Evidence in research for two systems. Research also provides compelling evidence that people operate with two different processing systems. A great deal of research has been conducted on what is referred to as heuristics, defined as cognitive short-cuts that are often illogical but that serve their purpose reasonably well when a high degree of accuracy is not required. For present purposes, it will suffice to present two examples from my own research on the existence of two information-processing systems. In one of the studies (reported in Epstein, 1994, 2003) participants were presented with the following vignette adapted from a study by Miller and Gunasegaram (1990). A rich benefactor tells three friends that if each throws a coin that comes up heads, he will give each $100. The first two throw a heads, but Smith, the third, throws a tails. When asked to rate how each of the friends feels, most participants report that Smith feels guilty and that the others are angry. In an alternative version in which the stakes are reduced, the ratings of the degree of guilt and anger are reduced. When told that the other two had previously intended to invite Smith to join them on a gambling vacation where they would share profits and losses and asked if the others would now invite Smith to join them most participants said they would not "because he is a loser." These responses were made from the perspective of how the participants said they and others would react in a real situation. When responding from the perspective of how a completely logical person would react, most said a logical person would of course invite Smith because the outcome of a coin toss is arbitrary.

My favorite research on two systems concerns the ratio-bias (RB) phenomenon. In experiments investigating the phenomenon, the experiential and rational systems are placed in direct conflict with each other and people have simultaneous access to the outcomes of the processing of both systems. Participants are informed that the task requires them to choose between drawing from two trays that contain a different total number of red and white jellybeans (e.g., 10 or 100) but the same proportion (e.g., 10%) of red jellybeans (Kirkpatrick & Epstein, 1992). One of the trays contains 1 red jellybean out of 10 jellybeans and the other

contains 10 red out of 100 jellybeans. On every trial in which a red jellybean is blindly selected there is a $2.00 pay-off. When the problem is presented as a verbal exercise with no real pay-offs, participants report that it would make no difference to them from which tray they selected as the probabilities of obtaining a red jellybean are the same, and they therefore would not pay a single penny to choose from a tray of their choice rather than having the selection determined by a coin-toss. When they are asked how they believe most people would respond in a real situation, they say most people would prefer to select from the tray with more red jellybeans. This happens to be true, but how do they know it? The only way they can know it is by detecting a tendency to behave that way in themselves, but they inhibit its expression because they consider themselves rational people, a judgment they apparently do not extend to others.

An interesting change in results occurs when we place participants in a real situation with real pay-offs. In a real situation most participants prefer to select from the tray with more red jellybeans and are willing to pay small sums of money, which they were given beforehand, for the privilege of doing so. Several indicate with some embarrassment that they know it is foolish to pay for a choice between equal probabilities, but somehow they feel they have a better chance of getting a red jellybean when there are more of them. Of even greater interest are the responses when unequal probabilities are presented in the two trays. In such a circumstance, most prefer to select from a 9% frequency-advantaged tray (e.g., 9 red out of 100 jellybeans) rather than from a 10% probability-advantaged tray (e.g., 1 red out of 10 jellybeans). As the degree of the probability-disadvantage is increased from 9% to 5% in the tray with 100 jellybeans compared to 10% in the tray with 10 jellybeans, not surprisingly fewer participants select the frequency-advantaged over the probability advantaged choice (Denes-Raj & Epstein, 1994). Thus, most are willing to make non-optimal responses but only to a limited extent. It is noteworthy that even among those who consistently prefer the probability advantaged choice several comment that they felt a conflict between choosing from the probability-advantaged and the frequency-advantaged selection.

How can the ratio-bias phenomenon be explained? Why do most

people behave against their better judgment? The explanation according to CEST is that the experiential/intuitive system is more responsive to frequencies than to ratios because frequencies are concrete and ratios are abstract and the understanding of and reactivity to frequencies is so fundamental that it is exhibited by non-human animals and preverbal children. In contrast the rational system understands ratios as well as frequencies. In conclusion, the ratio-bias phenomenon provides particularly compelling evidence that people operate with two information-processing systems in a manner that is consistent with the existence of the two processing systems proposed by CEST.

The Manner of Operation of the Two Processing Systems

The experiential/intuitive and rational systems operate according to different master motives, process information by different operating rules, and have additional different processing attributes.

The master motives of the two systems. The master motive of the experiential/intuitive system is to behave according to the hedonic principle, the pursuit of pleasurable feelings and the avoidance of unpleasant feelings. The master motive of the rational system is the reality principle, to be accurate, logical, and realistic. According to CEST all behavior is influenced by both motives, with their relative influence varying from almost no influence to almost complete dominance by one of the motives. It follows that in order to understand a particular kind of human behavior, it is necessary to understand the nature of the interaction of the two master motives. An important aspect of the interaction is that people tend to rationalize by attributing their primarily experiential/intuitively determined thoughts and behavior to their rational system. That is, as the experiential/intuitive system normally operates outside of awareness, people commonly seek an explanation for their thoughts and behavior by attributing them to their conscious rational system. Such rationalization reveals that people's conscious thoughts and behavior is far more determined by the hedonic principle than people realize. Since all behavior according to CEST is determined by the combined influence of both master motives, it follows that the manner in which people normally

rationalize is that they find the most favorable explanation they can think of that is within acceptable limits of being realistic.

Operating principles and attributes of the two systems. The experiential/intuitive system operates by the rules that govern automatically learning from experience. There are three forms of such learning: classical conditioning, operant conditioning, and observational learning. In classical conditioning an organism learns to associate stimuli with outcomes. A dog hears a tone and learns that it predicts the delivery of food. In operant conditioning an organism learns to associate responses with outcomes. An animal presses a bar and receives food, or in avoidance operant conditioning an animal hears a tone following which if it presses a lever in time it can avoid an electric shock. In observational learning animals vicariously learn to connect both stimuli and responses with outcomes by observing the behavior of others. All of these forms of learning involve association, contiguity, similarity and affective reinforcement. Through all three forms of such learning, all higher-order animals, including people, automatically construct a working model of the world. Humans also form a model of the world based on their reasoning with the aid of language. To a considerable extent their two models coincide, but they are not identical and the differences between them can be a source of stress.

To understand the operation of the experiential/intuitive system it is not only necessary to understand its operating principles, which were just briefly summarized, but also to be aware of how its attributes differ from those of the rational system. A comparison of the attributes of the two systems of information-processing is presented in Table 1. Note that almost all of the attributes of experiential/intuitive processing in humans can be applied to non-human animals. The exceptions are narrative processing and the use of metaphors that include speech and therefore have a significant subordinate rational component. It will be recalled, in this respect, that it is assumed in CEST that all behavior is influenced by both systems, with their relative influence varying from negligible to near total influence.

EXPERIMENTAL/INTUITIVE SYSTEM	RATIONAL SYSTEM
1. PLEASURE-PAIN ORIENTED (WHAT FEELS GOOD)	1. REALITY ORIENTED (WHAT IS ACCURATE AND LOGICAL)
2. HOLISTIC	2. ANALYTIC
3. ASSOCIATIVE RELATIONS	3. CAUSE-AND-EFFECT RELATIONS
4. MORE OUTCOME ORIENTED	4. MORE PROCESS ORIENTED
5. BEHAVIOR MEDIATED BY "VIBES" FROM PAST EXPERIENCE	5. BEHAVIOR MEDIATED BY CONSCIOUS APPRAISAL OF EVENTS
6. ENCODES REALITY IN CONCRETE IMAGES, METAPHORS & NARRATIVES	6. ENCODES REALITY IN ABSTRACT SYMBOLS, WORDS & NUMBERS
7. MORE RAPID PROCESSING: ORIENTED TOWARD IMMEDIATE ACTION	7. SLOWER PROCESSING: ORIENTED ALSO TOWARD DELAYED ACTION
8. SLOWER TO CHANGE: CHANGES WITH REPETITIVE OR INTENSE EXPERIENCE	8. CHANGES MORE RAPIDLY: CHANGES WITH SPEED OF THOUGHT
9. MORE CRUDELY DIFFERENTIATED: BROAD GENERALIZATION GRADIENT; CATEGORICAL THINKING	9. MORE HIGHLY DIFFERENTIATED; NUANCED AND DIMENSIONAL THINKING
10. MORE CRUDELY INTEGRATED: ORGANIZED IN CONTEXT - SPECIFIC COGNITIVE - AFFECTIVE NETWORKS	10. MORE HIGHLY INTEGRATED: ORGANIZED BY ACROSS-CONTEXT GENERALIZATIONS
11. EXPERIENCED PASSIVELY AND PRECONSCIOUSLY: PEOPLE FEEL SEIZED BY THEIR EMOTIONS	11. EXPERIENCED ACTIVELY AND CONSCIOUSLY: PEOPLE FEEL IN CONTROL OF THEIR CONSCIOUS THOUGHTS
12. SELF-EVIDENTLY VALID: "EXPERIENCING IS BELIEVING"	12. REQUIRES JUSTIFICATION BY LOGIC OR EVIDENCE

Table 1. Comparison of the experiential/intuitive and rational systems

Which system is superior? It is often assumed that the rational system is superior to the experiential/intuitive system as it is responsible for humankind's unique accomplishments. The experiential/intuitive system is commonly regarded as a relatively crude system that provides acceptable solutions when quick and dirty methods are sufficient. This view is not only the prevalent view among cognitive psychologists it is also supported by a considerable body of research. Nevertheless, there is a serious problem with it. Although the rational system is clearly far superior to the experiential/intuitive system in solving intellectual problems, it is inferior to the experiential/intuitive system in other important ways. Table 2 presents a comparison of the two systems on a variety of abilities and attributes based on research with the Rational-Experiential Inventory (REI).

RATIONAL THINKING STYLE	EXPERIENTIAL THINKING STYLE
POSITIVE ATTRIBUTES	**POSITIVE ATTRIBUTES**
High intellectual performance	Good interpersonal relationships
High meaningfulness in life	High social popularity
High realistic thinking	Secure attachment style
Low stress in college life	High agreeableness
High self-esteem	High empathy
Favorable beliefs about the self and the world	High spontaneity
Low neuroticism	High extraversion
Low anxiety	High emotional expressiveness
Low depression	High aesthetic sense
High conscientiousness	Good sense of humor
High open-mindedness	High creativity
High personal growth	High open-mindedness
	High personal growth
NEGATIVE ATTRIBUTES	**NEGATIVE ATTRIBUTES**
Tendency for dismissive relationship style	Naïve optimism
	Pollyannaish thinking
	Stereotypical thinking
	Superstitious beliefs
	Unrealistic beliefs

Table 2. Correlates of Rational and Experiential Thinking Styles

The REI is a self-report test with separate scales of a rational and an experiential/intuitive thinking style. Although many of the measures with which the REI was correlated were self-report personality inventories, others were objective measures of performance (e.g., Epstein, Pacini, Denes-Raj, & Heier, 1996; Norris & Epstein, 2010; Pacini & Epstein, 1999; Pacini, Muir, & Epstein, 1998). The latter included performance in experimental situations, intelligence test scores, and performance on tasks that measured creativity, sense of humor, intuitive ability, and aesthetic judgment. It is obvious from the results summarized in Table 2 that no meaningful statement can be made about the general superiority of either system, as each is superior in some important ways and inferior in other equally important ways.

It is important in interpreting Table 2 to recognize that high scores on an experiential thinking style can be obtained in very different ways. For example a person can be high on empathy, creativity, and most or all

of the other favorable attributes of an experiential/intuitive thinking and low on naïve optimism, superstitious thinking and all of the other negative attributes of such a thinking style, or a person can exhibit the reverse pattern. Although a person with a strong experiential thinking style will have a tendency to respond in terms of its negative as well as positive attributes. This does not mean the person will engage in superstitious and unrealistic thinking. The person could inhibit or modify the negative tendency into a more positive derivative, such as being open-minded to new possibilities.

It can be seen in Table 2 that a rational thinking style is more strongly related to intellectual performance and to a variety of measures related to adjustment, such as low anxiety, depression, stress, and neuroticism and high self-esteem, and meaningfulness of life. An experiential/intuitive thinking style is superior on such attributes as creativity, empathy, aesthetic judgment, and intuitive ability, and in establishing satisfactory interpersonal relationships (for a more detailed summary of most of this research see Epstein, 2003 and Norris & Epstein, 2010). Fortunately, there is no need for people to choose between the two styles of thinking as they are independent, so it is possible to be high on both, low on both, or high on either and low on the other.

Another interesting way to compare the two systems is according to the role they play in establishing "truth," with truth operationally defined as the construction of a sufficiently accurate working model of reality to facilitate effective adaptation to the environment. The experiential/intuitive system establishes such truth by empirically learning from experience and the rational system does so by reasoning with the aid of language. It might seem that the reality principle, as the master motive of the rational system, is ideally suited for pursuing truth, whereas the hedonic principle is a source of illusion. This is only partly true for the hedonic principle is both a source of establishing reality and of illusion. It establishes an accurate working model of the world s by its role in reinforcement in the three associative learning procedures, namely classical conditioning, operant conditioning, and observational learning. Thus animals (including humans) are motivated to repeat behavior that was followed by good feelings in the past and to avoid behavior that was followed by bad feelings. Strange as it may seem, feelings and emotions thereby play an essential

role in constructing a "true" working model of the environment by non-human animals. As for humans, the picture is more complicated because humans also have a rational system that is influenced by their experiential/intuitive system and therefore by the hedonic principle. Thus, although the hedonic principle contributes to the establishment of a working model of reality in humans, it also contributes to bias and illusion because of the influence of wishful thinking on conscious thought and reasoning. For example, the widespread belief of humans in a happy and trouble-free life after death and the arduous steps, as in ancient Egypt, to prepare the way with gifts and rituals that will guarantee a safe journey can probably be explained by the hedonic principle influencing people's thinking and behavior.

The interaction of the Two Systems

The experiential/intuitive system as a source of bias and illusion in decision-making. I noted that the experiential/intuitive system in humans can be a source of both truth and illusion. As the experiential/intuitive system automatically influences all behavior, it must influence conscious thinking and reasoning, which are regarded in CEST as simply another form of behavior. Under the influence of the hedonic principle people are unconsciously biased to consciously think in the most favorable way they can within acceptable reality constraints. The experiential/intuitive system most often influences thought and behavior in ways that are not obviously irrational. Nevertheless, it biases people's conscious information-processing in a manner that prevents them from being objective, rational decision-makers.

The advantages and disadvantages of each system in influencing the other system. Understanding the advantages and disadvantages of each system in influencing the other system can provide useful guidelines for improving people's decision-making ability. The experiential/intuitive system has two advantages in influencing the rational system. One advantage is that it normally operates outside of awareness so the rational system does not know it is being influenced. Another advantage is that after it has biased people's conscious thinking it promotes rationalization so that

the person is convinced that his/her experientiallly/intuitively influenced thinking and reasoning was completely rationally determined. As noted previously, such rationalization provides the most favorable explanation a person can think of that is within acceptable reality constraints. On its part, the rational system has a single advantage, but one that is up to the task of countering the influence of the experiential/intuitive system. The advantage of the rational system is that it can understand the experiential/intuitive system whereas the experiential/intuitive system cannot understand the rational system; it just automatically reacts. However, for the rational system to implement its one potential advantage, it must attend to the operation of the experiential/intuitive system and detect its potential influence. Only by detecting and then evaluating the promptings of the experiential/intuitive system can a person escape its biasing influence and be able to reason objectively.

Regarding the two processing systems as partners. As previously noted, neither processing system is superior to the other as each has unique advantages and disadvantages. They both play an important role in decision-making. Of particular importance for decision-making, the rational-system can learn from the experiential/intuitive system, control it, and train it. It can learn from it by accessing its information with procedures shortly to be discussed. It can control it by evaluating its promptings after having identified them and deciding whether to express or to suppress their expression. It can train it by providing it with corrective experiences in reality and in fantasy. Through the course of a lifetime, the experiential/intuitive-system never ceases automatically to learn from experience, but the learning can be adaptive or maladaptive. Unfortunately, for most people the learning occurs in a haphazard manner.

Very young children have poor emotional control. When they cannot obtain what they want they have temper tantrums. They are narcissistic and poorly socialized. With maturation, they improve in these respects, but some become more emotionally mature and civilized than others. It is unfortunate that no formal training is provided for improving people's experiential/intuitive information-processing. As a result of informal training and observation almost all adults learn not to have temper tantrums, cry at the slightest injury, or strike out at accidental sources of

frustration. Otherwise their learning to improve the functioning of their experiential/intuitive system is haphazard and subject to the occurrence of fortuitous events. Although it is possible, and every bit as important, to train the experiential/intuitive mind as to train the rational mind, society provides no formal education for the former and many years of education for the latter. Not only would educating the experiential/intuitive mind improve people's decision-making, it would more generally contribute to their wellbeing and practical, emotional, and social intelligence (for a further discussion of this issue, see Epstein, 1998).

How and When to Use Intuition in Decision-making

Detecting the operation of your experiential/intuitive system. If you wish consistently to be in a position to benefit from, rather than often to be disadvantaged by your experiential/intuitive system you have to be able to detect its operation. In the absence of such detection, your decisions will be influenced by your experiential/intuitive system outside of your awareness, which will lead you to make poor decisions. Following are some general principles based on the rules and attributes of experiential/intuitive processing that can serve as useful guidelines for detecting its influence when making decisions. As the major motive of the experiential/intuitive system is the hedonic principle it will tend to influence you to respond in a manner that is either wish-fulfilling or fear-fulfilling (which serves to alert you to danger and thereby avoid unpleasant affect). Therefore in making decisions it is helpful to consider whether some of the alternative decisions you are considering are influenced by wish-fulfillment or fear-fulfillment and, if so, whether either provides a good or a poor reason for making a particular decision.

A fundamental attribute of the experiential/intuitive system is that it operates in conjunction with feelings. You can therefore detect its influence by attending to your feelings. Ask yourself how making each of the alternative decisions you are considering makes you feel. This will tell you what your experiential/intuitive system will tend to influence you to do. It remains for you to decide whether to accept or reject such influence. Remember that your experiential/intuitive system is reacting to information that your conscious rational mind may be unaware of. In evaluating

the influence of your feelings, it can be helpful to understand where they are coming from in past experience. For example, consider whether the feelings are the result of a reasonable generalization or an over-generalization from past experience. Also consider the long-term consequences of a decision, which should over-ride the influence of short-term feelings. The importance of feelings will vary with the nature of the decision. If the decision will influence how you will likely feel in the long run about a work of art or music, obviously feelings are of great importance. If, on the other hand, you have to make a decision about an intellectual problem, your feelings about what is the best decision can lead you astray.

You can also engage your experiential/intuitive system with the aid of imagery as the experiential/intuitive system reacts to imagery in a similar way to how it reacts to reality. This has been demonstrated in neurological research in which the same regions of the brain are activated when people vividly imagined a situation as in reality (Kossly, Ganis, & Thompson, 2001). It has also been demonstrated in behavioral research (Epstein & Pacini, 2001), in which vivid imagination of the ratio-bias experimental paradigm produced the same results as real experience and different results from verbal presentation without vivid imagination.

The use of imagery provides a more convenient and safer way of trying things out than by behaving in the same manner in reality. You can imagine various outcomes and consider how plausible the scenario was that produced a particular outcome. You can also obtain information on the feelings that are evoked by imagining different scenarios.

As the experiential/intuitive system operates in an automatic manner, you can observe its operation by attending to your automatic thoughts and images. These are the thoughts and images that outside of your awareness routinely determine your perceptions, emotions and habitual behavioral. Occasionally unbidden automatic thoughts and images may intrude into your consciousness. As you cannot have an emotion without an instigating cognition, you can work backwards from your emotions to the thoughts that likely instigated a particular emotion. Sometimes the thought that produced an emotion is evident. For example, someone unjustly accuses you and you regard the remark as unjust and deserving of retaliation, which triggers a feeling of anger. Interpret the same situation differently, such as that the presumed insult was ambiguous and no harm

was meant, and you will have a different emotion. At other times you will have to infer the interpretive thought from the emotion itself. In either event, awareness of the relation between emotions and their instigating thoughts and interpretations can provide you with a useful procedure for detecting automatic thoughts by attending to your emotions. Not only will you learn about your automatic thoughts from this procedure, you will also learn about your characteristic emotions. Both kinds of information can be informative regarding how your experiential/intuitive system automatically processes information.

If someone is an angry person, a sad person, or a happy person, it will bias the kinds of decisions the person makes. A characteristically angry person will tend to find fault with others, and a characteristically sad person will tend to find fault with oneself. Understanding the relation between automatic thoughts and emotions will also inform you of how you would have to change the former if you wished to change the latter. It will also allow you to detect and compensate for the bias in your decision-making that is introduced by your characteristic ways of assessing situations.

Another way you can engage your experiential/intuitive system is by free-association as the experiential/intuitive system makes connections by associations rather than by reasoning. As research has demonstrated, an experiential/intuitive style of thinking is related to creativity (Norris & Epstein, 2010). You can put this relation to good use by free-associating to alternative decisions. Note the different thoughts or images that come to mind without evaluating them or reasoning about them until later. You may come up with unexpected creative solutions that elude your logical, linear reasoning.

When to use intuition in decision-making. As a verbal reasoning system, the rational system is best relied on when accurate objective reasoning is required and where the nature of the problem lends itself to solutions by logical reasoning. The fly in the ointment, as discussed previously, is that the influence of the experiential/intuitive system when unidentified can distort the operation of the rational system. Assuming this is not of concern in a particular situation, such as when making decisions that require normative solutions and there are known algorithms

for solving the problem, being influenced by feelings or imaginary would be inappropriate as the rational system in such situations is far superior to the experiential/intuitive system. It is also superior in situations in which general principles can be applied across situations. In contrast, the experiential/intuitive system is generally superior in solving problems in which context-specific experience with valid feedback has been obtained.

When I go fly-fishing in a new area although I have considerable knowledge about the conditions that trout prefer, I always hire a guide on the first day. He has situation-specific experience on a river with which he is very familiar, whereas I have only knowledge about rivers and trout of a more general nature. If I fish without a guide, I may waste my time fishing behind many large rocks to no avail. I then hire a guide who bypasses all the rocks behind which I fished and instructs me to cast my fly behind a particular rock that to me looks no different from the others. When I do so, I immediately catch a large trout. The next day I bring my wife to the same spot and we both catch several trout. There is obviously a pattern of conditions behind that rock that I know nothing about such as an unseen current and the effect that heavy rains have had in gouging out a deep hole in which big trout lie. I have general abstract knowledge in my rational system whereas the guide has situation-specific validated experience in his experiential/intuitive system. In summary, when experience and context-specific validated information is available, the experiential/intuitive system is often superior to the rational system. When logical reasoning and the application of general principles can appropriately be applied, the rational system is far superior to the experiential/intuitive system.

There are important problems for which one cannot apply rules of logic for making decisions, as no appropriate algorithms for solving the problem exists. What can one do in such circumstances? Is it safe to rely on intuition? The answer is that it depends on the amount of experience with valid feedback that has been acquired in similar situations. Unless the person has had adequate feedback, the amount of experience by itself can be deceptive. A person may then have an intuitive feeling of what is the best decision is, but it is more likely to be the result of superstitious thinking rather than of valid information (Hogarth, 2001). Superstitious learning occurs when people have had experience in situations in

which they obtained ambiguous, deceptive or unrepresentative feedback. For example, a clinical psychologist who has a great deal of experience in interpreting Rorschach tests may be confident about the validity of his Rorschach reports. His confidence stems in part from his ability to write elegant reports that others admire. However, unless he has had valid feedback about his diagnostic conclusions, which often involve highly subjective criteria regarding their validity, his and others' confidence in his reports are likely to be spurious. That is, they are more likely based on superstitious thinking as the result of a few unrepresentative correct predictions rather than on an adequate sample of predictions validated against objectively established criteria.

More often than not, the valid feedback that people receive is based on experience that was not objectively established, but was inherent in the nature of the experience itself and may have been received outside of awareness. The value of receiving such experientially valid information outside of awareness is well illustrated by an incident concerning a life-and-death decision by a naval commander (reported in Lehrer, 2009). Lieutenant Commander Michael Riley was monitoring radar screens on the HMS Gloucester outside of Kuwait when he noted a blip on a radar screen. The blip was moving rapidly toward an American battleship that it would probably sink if it were an enemy missile. The problem for Riley was that the blip could be produced either by friendly planes returning to their aircraft carrier or by an enemy missile. He reports having become very anxious having to make a life-and-death decision with only seconds to decide. He ordered two surface-to-air missiles to be fired, which exploded the object. It turned out that the object was a missile. How did he know? He said he did not know how he knew. He just had a feeling that the object was not a returning aircraft, and he acted on that impression. In a later investigation it was decided that he had had a great deal of experience observing planes landing on aircraft carriers and that something must have registered in his unconscious mind that the pattern he saw on the radar screen was not quite right for an aircraft returning to base. More formal research on unconscious pattern recognition supports this interpretation (e.g., Reber, 1993).

The important lesson to be learned from this example and relevant research is that such unconscious knowledge is dependent on experience

with valid feedback. This same principle can account for why chess masters can simultaneous play against 15 less expert opponents and quickly defeat all of them. The reason for this is that the chess-masters have rapid unconscious pattern recognition so that it is not necessary for them to reason about each move. In a classic study by William Chase & Herbert Simon (1973) they found that chess experts could reproduce the layout of pieces on a chessboard after just a glance of a few seconds.

Another situation in which the experiential/intuitive system makes better decisions than the rational system is when holistic, rather than analytic information-processing is required. This is because the experiential/intuitive system processes information in a holistic manner whereas the rational system does so analytically. As previously noted, making certain decisions based on analytical analysis in the rational system can interfere with the ability to make better decisions based on holistic impressions in the experiential/intuitive system (Wilson, Lisle, Schooler, Hodges, Klaaren, & LaFleur (1991); Yanko & Epstein, 1999).

Intuition is also superior to rational analysis when making decisions about what is likely to be pleasing in the long run. In a study in which students were given posters to take home, one group was told to list the reasons why a poster was attractive to them before deciding on which poster to take home. Another group was told just to select the poster that appealed to their feelings. (Wilson &Schooler, 1991). A few weeks later the latter group that relied on their feelings was more pleased with their selection than the group that engaged in analytical reasoning. The reason why the experiential/intuitive system provided superior decision- making than the rational system in this case is that feelings are an important component of the experiential/intuitive system and predicting feelings was the concern of interest. It follows that it makes sense to follow the promptings of your experiential/intuitive system when making decisions about feelings

Conclusion

There is no magic formula for deciding when to follow intuitive impressions and when to disregard them. However, understanding how the experiential/intuitive system operates and when it can be expected to provide valid or invalid information can provide some useful guide-

lines for decision making. Most important, you should not only be able to determine when your experiential/intuitive system is likely to have valid information, you should also be alert to intuition's guise as a false temptress who is adept at using her hedonic wand to lead you astray or who can change her form to a magician who distorts your reasoning outside of your awareness and then causes you to rationalize so you believe your biased reasoning is objective. Remember, the only way you can be rational and objective according to CEST is to be in touch with the operation of your experiential/system so that you can follow, modify, or reject its promptings based on your rational thinking. Beyond being objective there is also much to gain by forming a partnership between your rational and experiential/intuitive systems, for each has unique attributes and each has limitations that can be compensated for by the other. As the two information-processing systems are independent, it is possible to develop a thinking style in which both are used to maximum advantage in decision-making rather than in a way in which the dominant use of one interferes with the ability to use of the other.

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PALESTRAS
LECTURES

INTUITION AND DECISION-MAKING - NEUROSCIENCE

Meeting Report

Axel Cleeremans[1], John-Dylan Haynes[2], Hauke Heekeren[3], Thomas Goschke[4], Fernando Lopes da Silva[5]

This section summarizes the proceedings of the session "Intuition and decision-making", held on the morning of April 8th, and organized jointly by Thomas Goschke and Fernando Lopes da Silva. In recent years, the question which role of explicit, conscious, and deliberative thought processes on the one hand, and implicit, unconscious, and intuitive processes, play in human decision-making has attained considerable interest, both in experimental psychology and the cognitive neurosciences. While some researchers have claimed that unconscious information-processing and intuitive judgments are computationally powerful and often lead to better choices than conscious deliberation, others have taken a more skeptic position and have raised doubts concerning the validity and interpretation of alleged evidence for the "power of intuition". The symposium brought together experts from experimental psychology and cognitive neuroscience who presented critical state-of-the art reviews, own recent research, and personal perspectives on intuition, decision-making, and voluntary action.

To think or not to think? Reassessing unconscious thought theory

Axel Cleeremans

In his presentation, Prof. Cleeremans addressed the controversial question whether complex multi-attribute decisions (e.g., choosing a car

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or an apartment) are best made without conscious deliberation and critically discussed recent claims that "unconscious thought processes" may lead to superior information-processing compared to conscious deliberation about possible choices. Prof. Cleeremans started with a concise overview of exemplary findings from cognitive and social psychology indicating that we are often unaware of the factors that influence our decisions and that the reasons we provide for our decisions may be post-hoc rationalizations rather than causal antecendents. Since the influential review by Nisbett and Wilson in the late 70s, a multitude of studies have provided evidence that a wide range of decisions (ranging from consumer choices to decisions whether to act cooperatively) can be influenced by stimuli, even if the individual is not aware of a causal link between the stimuli and his or her decisions. Extending such findings, Dijksterhuis and his coworkers recently proposed that complex decisions involving a large number of variables actually benefit from relying on unconscious thought processes compared to conscious deliberation. In support of their thesis, in a recent study Dijksterhuis, Bos, Nordgren and van Baaren (2006) showed that conscious thought improved simple choices, whereas with complex choices participants made more optimal decisions when they were asked to make their choice after being distracted through performing an anagram solving task ("unconscious thought" condition), compared to when they were given the opportunity to engage in deliberate, conscious thinking ("conscious thought" condition). From this the authors derived their "deliberation-without-attention" hypothesis, according to which complex decisions benefit from a period of distraction assumed to elicit "unconscious thought", which in contrast to conscious thoughts leads to a more optimal and comprehensive weighting of a large number of decision attributes. This study has attained considerable scientific as well as public interest, suggesting that in making complex decisions one better trusts one's intuitive gut feelings. Prof. Cleeremans took issue both with the theoretical claims as well as with the relevant empirical findings of the Dijksterhuis et al. (2006) study. He reported on five experiments aimed at replicating the findings of Dijksterhuis et al (Waroquier, Marchiori, Klein, & Cleeremans, 2009). The first three experiments comprised conceptual, identical, and methodologically improved replications of the Dijksterhuis & et al.'s design, but failed to

obtain evidence that decisions made after a period of distraction were better than after a period of conscious consideration. A further experiment showed that a majority of participants had in fact determined their attitudes towards each car before they engaged in the deliberation or distraction tasks, a finding that possibly explains the previous null results. In a final experiment Cleeremans and colleagues found that participants instructed to form an impression made better decisions after distraction than after deliberation, so replicating earlier findings. However, they also found that decisions made immediately were just as good as decisions made after distraction. According to Prof. Cleeremans this suggests (a) that people had already made their decision during information acquisition, (b) that no further thinking occurs during distraction, and (c) that ruminating about one's first impression can deteriorate decision quality. Strikingly, in another condition that should have favored unconscious thought, considered decisions were better than those made immediately or after distraction. These findings were replicated in a field study. In conclusion, Prof. Cleereman argued that the superiority of decisions made after distraction does not result from unconscious thought, but rather from the fact that conscious deliberation can deteriorate first impressions formed online during information acquisition. While not denying that complex unconscious information processing exists, he concluded that it may not be as powerful as previously claimed and that there is in fact no evidence for the idea that one can "think" without awareness. Prof. Cleeremans suggested an alternative view on intuitions according to which they are the product of expertise, i.e., when making intuitive decisions, experts rely on memory retrieval rather than computation. Thus, one should trust one's first impressions when one knows one is an expert, and think hard otherwise.

Unconscious determinants of human decisions
John-Dylan Haynes

Prof. Haynes gave an overview of recent studies from his lab in which he uses advanced pattern analyses methods in combination with functional magnetic resonance imaging (fMRI) to investigate the role of unconscious information processing in decision making and voluntary actions.

He first gave an introduction into statistical pattern recognition methods for fMRI. Whereas most fMRI studies focus on the BOLD signal as an indicator of neural activity in different brain regions, novel decoding methods carry the promise that one can "read out" the *content* of representations encoded in specific brain areas from patterns of brain activity across a set of voxels. For instance, Haynes et al. (2007) used pattern recognition methods to investigate the free selection of intentions. At the beginning of each trial participants had to covertly choose one of two possible tasks - to either add or subtract two numbers. After a delay, during which subjects covertly maintained their intention, two numbers were presented and subjects were then required to perform the selected task (addition or subtraction) on the two numbers. Next two correct answers (for either addition or subtraction) and two incorrect answers were shown and subjects pressed a button to indicate which answer was correct for the chosen task. From the button press it was possible to determine the covert intention of the subject during the previous delay period. Applying pattern recognition methods to fMRI signals in specific regions of the prefrontal cortex it was possible to read out the subjects' intentions significantly above chance based on their brain activity - even before the participants had seen the numbers and had started to perform the calculation. As participants made their choices covertly and well before they knew which numbers they were supposed to add or subtract, one can be relatively sure that the intention itself was being read out, rather than brain activity related to *executing* the calculation or movement-related activity related to pressing the buttons to indicate the response. A more recent study (Tusche, Bode, & Haynes, 2010) investigated whether it is possible to decode implicit preferences for consumer products outside the focus of attention. The authors used fMRI to measure brain responses to pictures of cars. In one experimental group (high attention) participants were instructed to closely attend to the products and to rate their attractiveness. In the second group (low attention), participants were distracted from products and their attention was directed elsewhere. After scanning, participants were asked to state their willingness to buy each product. During the acquisition of neural data, participants were not aware that consumer choices regarding these cars would subsequently be required. Multivariate decoding was then applied to assess the choice-related pre-

dictive information encoded in the brain during product exposure in both conditions. Distributed activation patterns in the insula and the medial prefrontal cortex were found to reliably encode subsequent choices in both the high and the low attention group. Importantly, consumer choices could be predicted equally well in the low attention as in the high attention group. This suggests that neural evaluation of products and associated choice-related processing does not necessarily depend on attentional processing of available items. In a final study (Soon, Brass, Heinze, & Haynes, 2008), Prof. Haynes and his colleagues took up a research strand iniated by Benjamin Libet in the 1980s and examined whether a subjects' intentions can be inferred from their brain activity before the moment at which subjects report becoming conscious of their intention. Participants were instructed to freely decide whether to press a button with their left or right hand and they were free to make this decision whenever they wanted. At the same time they had remember which letter in a stream of letters was presented when they felt they had made up their decisions. After each response, subjects indicated when they had made their motor decision by selecting the corresponding letter from a set of four letters. Remarkably, the local spatial pattern of brain activity in the frontopolar cortex allowed predicting the upcoming choice slightly but significantly above chancel level already seven seconds before the moment at which subjects reported having consciously made their decision. Prof. Haynes interpreted this finding as evidence that decisions are unconsciously prepared much longer ahead in time than previously assumed. Taken together, the findings of Prof. Haynes and his group challenge our belief that our decisions rest on a conscious analysis of the available evidence and provide evidence for the importance of unconscious or implicit processes for human decision making. Although at present the possibility to decode intentions from neural activation patterns is far from perfect, the findings already raise important open issues, for instance, whether and under which conditions early unconscious "decisions" may still be reversed and which brain areas may be involved in such revisions.

Modulators of human decision-making: genes and social information

Hauke Heekeren

In his presentation, Prof. Heekeren addressed the interaction of genetic variation and social influences on decision making. He first outlined a conceptualization of decision making as consisting of four processing stages: (1) recognition of the present situation (or state); (2) evaluation of action candidates (or options) in terms of how much reward or punishment each potential choice would bring; (3) selection of an action in reference to one's needs; and (4) reevaluation of the action based on the outcome. To investigate modulating influences and neural correlates of decision making processes, Prof. Heekeren and his group employ reward-based decision making tasks, in which on each trial the subject is presented a number of cues (e.g., visual shapes) and has to choose one them. Each choice option leads with a certain probability to an outcome (usually a monetary gain or loss of a particular magnitude) and the subject receives feedback about the outcome. Importantly, an outcome can be identical to or deviate from the subject's previously established expectations (i.e., a gain may be higher or lower than expected). According to a popular model of reward-based decision making, learning to make optimal choices is based on the reward prediction error, i.e., the difference between outcome and expectation drives learning such that large predictions errors induce a large change of expectations, while small or absent errors induce small or no changes of expectations. Single cell recordings in experimental animals as well as fMRI studies in humans indicate that activity in brain areas including the ventral striatum and orbitofrontal cortex appears to code the prediction error. Moreover, there is evidence that the neurotransmitter dopamine plays a critical role in coding the reward-prediction error in striatal brain areas. In a recent study, Prof. Heekeren and his coworkers investigated how reward-based learning and decision making is moderated by genetic variation related to dopaminergic neuromodulation (Krugel, Biele, Mohr, Li, & Heekeren, 2009). In particular, they tested the hypothesis that a genetic variation of the COMT gene, the Val158Met polymorphism, is associated with interindividual differences in reward-based learning and the flexibility

with which individuals adapt to sudden changes in reward contingencies. They used a so-called reversal learning paradigm, which requires rapid and flexible adaptation of decisions to changing reward contingencies in a dynamic environment. Interestingly, carriers of the phylogenetically ancestral Val/Val genotype showed a behavioral advantage in the reversal learning task. When the behavior of the participants was mathematically modeled with a reinforcement learning model with a dynamic learning rate to estimate prediction error and learning rate for each trial, carriers of the Val/Val genotype (compared to the Met/Met genotype) showed a higher and more flexible learning rate. In particular, when confronted with a sudden change in the reward contingencies, carriers of the Val/Val showed a much larger increase of the learning rate, indicating that they were more flexible in revising reward expectations in response to unexpected outcomes. Moreover, model-based fMRI analyses revealed that this behavioral advantage was reflected on a neurobiological level in greater and more differentiated striatal fMRI responses to prediction errors. Learning rate-dependent changes in effective connectivity between the striatum and prefrontal cortex were greater in the Val/Val than Met/Met genotype, suggesting that the increased behavioral flexibility may reflect top-down effects of the prefrontal cortex which are presumably mediated by genetic differences in dopamine metabolism. These results show that dopamine plays a critical role in modulating the influence of a particular prediction error on the updating of reward expectations for subsequent decisions, and thereby provide important insights into neurobiological mechanisms underlying decision making in the face of changing reward contingencies. In the final part of his talk, Prof. Heekeren extended the discussion of modulators of human decision making from neurogenetic influences to the role of social information. In particular, he showed that social advice given to subjects in a reward-based decision making task had a strong influence on subjects' choices. This influence possibly reflects the fact that advised options receive an extra "bonus" in the computation of expected reward such that gains are perceived as more positive and/or losses as less negative. In conclusion, the work of Prof. Heekeren and his group nicely illustrates that a comprehensive understanding of human decision making requires integrating different strands of research and levels of analysis, including formal mathematical models of reward-

based learning, neuroimaging studies of underlying brain circuits, genetic analyses of individual differences in neuromodulatory systems, and studies of social influences.

Beyond free will: Towards a cognitive neuroscience of decision-making and volitional control

Thomas Goschke

In his presentation Prof. Goschke focused on the role of unconscious determinants of voluntary action and the feeling of agency. To set the stage, he briefly discussed contrasting philosophical concepts of free will and argued for a naturalistic stance according to which voluntary actions are not free in the sense that they are undetermined, but rather that they *determined in special ways* (Goschke, 2003). What sets voluntary action apart from involuntary behavior is not that they are independent from any causal determinants, but rather that they depend on evolved cognitive control competencies which enable humans to select actions on the basis of their anticipated future effects and to maintain long-term goals in the face of strong competing habitual or impulsive responses. In addition to philosophical controversies, the concept of volitional control has been challenged on empirical grounds. In particular, it has been argued that conscious will is an illusion, because voluntary actions are determined by unconscious brain processes rather than by conscious intentions. Instigated by seminal investigations by Benjamin Libet, several studies have shown that neural processes underlying the preparation of a voluntary movement (as reflected in readiness or lateralized readiness potentials) start well before the person becomes aware of the intention to move. However, while such findings have often been interpreted as evidence that conscious intentions play no role in the causation of actions, Prof. Goschke argued that this role is simply more indirect as one might have thought. Rather than being the *immediate triggering causes* of single motor movements, intentions are better conceived as *internal constraints* which configure processing systems and set specific behavioral dispositions into readiness, thereby biasing which response will be activated by a subsequent stimulus. Importantly, once set into readiness, responses that depend on a prior intention can nevertheless be triggered automatically

and without additional conscious "act of the will", provided the trigger stimulus evokes no competing responses. In line with this idea several priming studies have shown that subliminal stimuli which are not recognized consciously can nevertheless activate motor responses which were mapped to the stimuli by a prior instruction. In conclusion, conscious intentions do not trigger single voluntary movements, but rather configure sensory, cognitive, and response systems such that intention-congruent responses will be activated with high probability by subsequent stimuli.

In the second part of his talk Prof. Goschke discussed evidence for unconscious determinants of conscious feelings of agency and control. There is evidence that the impression that a sensory event was caused by one's own action is not a direct indication of causal relations between intentions, actions, and their effects, but rather the result of an – in principle fallible - inferential process. In particular, the impression of voluntary control appears to rest on a comparison of anticipated and actual sensory effects of an action. If an action-effect was correctly anticipated prior to the action, the effect will usually be experienced as self-caused, whereas in the case of a mismatch between anticipated and actual effect, it will rather be attributed to an external cause. Critically, recent experiments indicate that representations of action-effects influence the impression of voluntary control even if they are activated unconsciously. For instance, using a subliminal priming paradigm Linser and Goschke (2007) showed that participants overestimated how much control they had over objectively uncontrollable stimuli, which appeared after free-choice actions, when a subliminal prime stimulus activated a representation of the alleged "action effect" immediately prior to the action. Conversely, when the unconscious "effect" representation was incongruent with the actual sensory event that appeared after the action, participants' judged their control over the alleged "effects" to be lower. This prime-induced control illusion occurred irrespective of whether or not the effect-primes were consciously recognized. While such findings have been interpreted as evidence that the experience of conscious will is an illusion (Wegner, 2002), Prof. Goschke argued that the fact that the conscious experience of control rests on a fallible causal inference does not necessarily imply that the feeling of control always deludes us. To the contrary, the comparison of predicted and actual sensory effects of one's actions is a highly adaptive mechanisms

that most of the time provides us with valid information as to whether an event was caused by us or some external force.

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AN EVOLUTIONARY APPROACH TO ANOMALOUS INTUITION

Richard Broughton *

Intuition is generally understood as knowledge or an insight, especially leading to a decision that does not seem to be arrived at by logical deliberation. Often it seems contrary to what would be expected by logical analysis. As can be seen from the papers in this symposium, we are beginning to understand the inputs to the intuitive process, among them the emotional system, especially unconscious emotional memories encoded in bodily feelings, and unconscious experiential learning.

Intuition, however, has always been associated with a hint of the anomalous, as frequently people report intuitive experiences that cannot easily be traced back to the typical inputs to the process that we have been considering. Examples of these experiences abound (Rhine, 1978; Stevenson, 1970) and often involve strong feelings that compel unexpected actions such as abruptly changing travel plans because of a 'feeling' that a relative needed them. The attacks on the World Trade Center towers generated a flood of reports such as one that was reported to me. It involved a woman who had a perfect attendance record over several years at her job in an office in one of the towers. She was proud of that record and had no intention of spoiling it, but early on the morning of the attack she awoke to the early morning sun streaming into her apartment and, quite unexpectedly found herself considering skipping work to enjoy the day in a park. After wrestling with this urge for a bit she gave in, turned off the alarm and went back to sleep. Of course, when she got up later and turned on the television she learned what she had missed.

It is, of course, an easy exercise to make reports like this seem trivial by chalking them up to coincidence or embellished memory, but for this woman it was a profound intuition, one that saved her life. Apart from its dramatic focus, it is just like all the other examples of intuition that we are considering in this symposium, but in this case, from where did the input to that intuition arise.

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Cases like this have traditionally been studied within the field of parapsychology where over the decades a substantial data base of experimental research supports the notion that people are capable of acquiring information without the use of the senses as currently understood, i.e., anomalously. Within parapsychology and its predecessor, psychical research, taxonomy of the phenomena exists: telepathy, clairvoyance, and precognition, often just lumped together as extrasensory perception, or ESP, for short. For the purposes of this talk, we can call them *anomalous intuition*, because that is what it seems like to the person who experiences it.

Within parapsychology, there is a growing consensus that the fundamental feature of anomalous intuition is the ability to acquire information from the future, also known as precognition. All other aspects of anomalous intuition can be subsumed within this. This derives mainly from theoretical models of the phenomena (Bierman, 2008; May, Utts, & Spottiswoode, 1995) but also from the simple realisation that all of the ESP phenomena do not really become anomalous until some point in the future when the experience is confirmed by an event or additional information arriving through normal channels. Thus, the fundamental extrasensory perception is that of seeing the future, but not just any future. *It is seeing one's own future.*

There is no escaping the fact that these phenomena have been stereotyped as supernatural, but it is by no means necessary to view ESP or anomalous intuition as beyond the reach of science. In this talk I propose to outline how anomalous intuition can be understood not just within science, but firmly grounded in an evolutionary understanding of human abilities.

We begin with a deconstruction of anomalous intuition following a model proposed in the 1940s by Tyrrell (1946) in which anomalous intuition is seen to consist of two stages. Stage one, called the *process* in Tyrrell's terminology, is an unconscious process in which the anomalous information is received by the organism. Stage two, called the *product*, is the means by which the anomalous information is transformed into useful information or behaviour by the organism.

Stage one is the properly anomalous part. How can information from the future travel backwards in time? How can information travel great

distances with no carrier medium? Stage one is a problem for physics to solve and there is no shortage of physicists working at it, as evidenced by a recent regional conference of the American Association for the Advancement of Science (AAAS) conference (Sheehan, 2006) and Professor Bierman's contribution to this symposium.

Stage two is not anomalous. This stage involves the normal psychological and neurophysiological processes of the human body. How anomalous intuition is utilised is most definitely for psychology and neuroscience to explain, but not unlike our efforts to understand all the other ways we gather and utilise information from the environment.

In trying to understand the stage-two components of anomalous intuition it is helpful to begin with an old maxim from engineering that I learned from a colleague, "If you want to find out how it works, first find out what it is for." As I have noted when I began this quest (Broughton, 1988) parapsychologists typically have not been moved to ask the question, "What are these strange abilities for?", preferring to revel in their strangeness rather than their utility.

Looking at the spontaneous cases that people report one might be tempted to think that the communication function was self-evident, but that does not stand up to close scrutiny as the 'communication' more often than not is very fragmentary and unreliable. Stanford was the first to explore seriously how extrasensory and other anomalous abilities might serve human needs. His Psi[1] Mediated Instrumental Response Model (PMIR) (Stanford, 1974) and its subsequent elaborations (Stanford, 1990) speculated elegantly that anomalous intuition may be part of a system that gathered useful information to serve human needs, but what those needs are remained rather non-specific. Inspired by Stanford's initiative, I argued that if we are to take ESP or anomalous intuition seriously then we had to look for the needs it serves in an evolutionary context (Broughton, 1988), although I must admit that at the time I was not able to be any more specific than Stanford. However, the 'bottom line' for an evolutionary interpretation of anomalous intuition is that it must serve to increase our fitness to breed, survive and help insure the survival of our offspring.

[1] In the parapsychological community psi is a general term for a range of anomalous phenomena, including ESP or anomalous intuition. It is not an acronym.

In the decades since I first proposed the idea there has been only limited interest in evolutionary explanations for anomalous intuition or ESP. Taylor (2003) offers a comprehensive analysis of what he describes as 'need-serving' theories of psi within a properly biological evolutionary context. He concludes that an evolved ESP ability would necessarily be limited or imperfect and would probably operate through an environmental scanning type of mechanism. Taylor's scanning mechanism, however, is not an active one, but rather "being in a state receptive to any information that may serve the needs of the organism" (Taylor, 2003, p. 11). McClenon (2002) on the other hand, plays down what he calls 'direct benefit' theories such as those examined by Taylor, in favour of an evolutionary model based on indirect and largely psychological benefits that would arise from beliefs in the efficacy of healing and similar paranormal phenomena.

Advancing the evolutionary understanding of anomalous intuition

To move an evolutionary understanding of anomalous intuition forward it is necessary to identify specific and significant advantages that anomalous intuition might convey. For Homo sapiens this will be more than just knowing where food can be found or where predators lurk. Finn and colleagues (Finn, Geary, & Ward, 2005) have argued that as early hominins gained a level of mastery over the environment social competition between and within groups of other hominins increased. This generated selective pressure for increased intelligence, the development of a theory of mind, and possibly other capabilities such as the ability to entertain alternative future scenarios and predict others' behaviour. While the evolutionary advantage gained must be significant, it need not be big advantage. Haldane (1927) has calculated that just a 1 percent advantage could spread throughout the population within just the evolutionary time period for our own genus, homo. A related issue, the extremely slow pace of evolution, is also no longer seen to be a major obstacle as scientists are finding more and more examples of relatively rapid evolution in humans (cf. Wade, 2007, Chapter 12).

If the fundamental role of anomalous intuition is to provide some

information of the future, then it may not need to work miracles to provide sufficient evolutionary advantage for selection to work. It has been noted (Broughton, 1988; Taylor, 2003) that the dramatic examples of anomalous intuition that are sometimes reported may not be typical of the 'normal' function of anomalous intuition. Most cases are described as hunches, feelings, or dreams that only make sense when some future event corroborates the initial impressions. Meta-analyses of the more successful lines of laboratory experiments on anomalous intuition have shown that the success rate (where anomalous intuition or ESP yields correct results) is very modest. The extensive US government funded programme into remote viewing (anomalous intuition by another name used in this case for 'psychic espionage') was said by even its supporters to have yielded actionable information in only about 15 percent of the real-world cases in which it was used (May, 1996). A key point frequently argued by the government researchers was that remote viewing was not a miracle source of information that solved all problems, but that it was most useful as an adjunct to the traditional means of collecting intelligence (May, 1996). This observation can equally be applied to anomalous intuition within the individual—it is not a magical window onto the future, but an occasional extra input to our normal sensory information gathering and processing systems. In this manner, anomalous intuition need not be correct or useful all of the time, but would need to be useful with sufficient frequency to be seen as an advantage by evolutionary selection. The result would be that anomalous intuition would be virtually indistinguishable from normal intuition.

Mental time travel

The hunt for how anomalous intuition would fit into the evolutionary development of homo sapiens has recently become more sharply focused thanks to the work of Thomas Suddendorf and Michael Corballis that highlights the role of what they call *mental time travel* (MTT) in human evolution (Suddendorf & Corballis, 2007a). Mental time travel is nothing more than our capacity to imagine the future. There is a growing recognition that mental time travel into the past—memory—and mental time travel into the future are closely related, and, according to

Suddendorf and Corballis, "the ultimate evolutionary advantage must lie with the capacity to access the future" (Suddendorf & Corballis, 2007a, p. 299).

Mental time travel is based on episodic memory, not semantic memory. It is the vast memory store of specific events experienced by the individual that form the basic building blocks from which can be constructed various possible futures. MTT is also a top-down generative process in which the memory images are arranged in such a way as to create a plausible 'lived' scenario, but one not yet experienced. The well-known fragility of memory fidelity actually facilitates the process by allowing a degree of flexibility in the construction of futures.

Suddendorf and Corballis make a compelling argument for the evolutionary importance of MTT. The increased behavioural flexibility that humans have by means of their ability to imagine, and therefore to prepare for, the future seems self-evidently an evolutionary advantage of the utmost importance. Suddendorf and Corballis go so far as to argue that our capacity for revisiting our past in memory is essentially a by-product of evolution's pressure to be able to predict the future (Suddendorf & Corballis, 2007a, p. 302), which they later call the 'Future-first hypothesis' (Suddendorf & Corballis, 2007b, p. 339).

MTT may also be uniquely human. Suddendorf and Corballis argue that the flexibility and generative nature of MTT is distinctly different from future-oriented behaviours of other animals (such as caching food, etc.) that are rooted in instinct and relatively inflexible. Evidence suggests this difference is rooted in the expanded prefrontal cortex of homo sapiens, though Suddendorf and Corballis are open to the possibility that future animal research may qualify the claim that MTT is uniquely human (Suddendorf & Corballis, 2007b).

This is not the place to present a detailed exposition of MTT, but it is important to note that there are important commonalities between key features of MTT and anomalous intuition.

MTT utilises episodic memory as the building blocks for the generated future scenarios. Anomalous intuition has long been recognized to be based on episodic memory. Memories and memory fragments are assembled to convey anomalous information. I have argued, quite independently of MTT, that the experiences fundamental to ESP and anoma-

lous intuition are similarly generated, though the inputs to that process remain obscure (Broughton, 2006).

Suddendorf and Corballis argue that offline processing is required in order to be able to combine the memories that will represent the future. In this sense, offline processing is the ability to disconnect the mental representational space from constant sensory input. Suddendorf and Corballis (2007a, p. 307) offer dreaming and daydreaming as examples of the offline capacity to assemble memories and merge these with recent input to represent the future. In parapsychology, it is well known that most spontaneous examples of ESP or anomalous intuition occur during the dreaming state, followed closely by daydream like states. Specific individuals with a 'talent' for anomalous intuition and who have been studied almost uniformly claim that they employ strategies of 'clearing the mind' to reduce sensory input and encourage spontaneous imagery. In addition to carefully conducted and highly successful dream studies (Ullman, Krippner, & Vaughan, 1989) the consistently most successful research paradigm for ESP, the ganzfeld experiment (Hyman, 2010; Storm, Tressoldi, & Di Risio, 2010a, 2010b) explicitly cultivates offline processing. It can easily be demonstrated that offline processing in precisely the sense meant by Suddendorf and Corballis is fundamental to successful anomalous intuition in both the laboratory and in life.

Finally, the argument that the fragmentary and malleable nature of episodic memory may be crucial to an evolutionary adaptiveness that derives not from accuracy but by providing a fluid and flexible 'vocabulary' of memory images also finds parallels in parapsychology research. In a wide range of experiments, stronger evidence of anomalous intuition has been associated with highly creative types, having good imaginations and cognitive flexibility. While not a strong link, this nonetheless suggests that imagination and cognitive flexibility may be a trait that underlies successful use of anomalous intuition as well as adaptive MTT.

Emotional input

Suddendorf and Corballis allow for affective input to the MTT process, but almost in passing, and largely by reference to the affect heuristic (Slovic, Finucane, Peters, & MacGregor, 2002). Commenting on

Suddendorf and Corballis, D'Argembeau and Van der Linden (2007) draw attention to the role of emotional input to the MTT process citing their own research and that of Damasio and Bechara (Bechara, Damasio, Tranel, & Damasio, 2005; Damasio, 1994, 1996). D'Argembeau and Van der Linden note that the emotional weighting of memories contributes to their likelihood of entering the recombinatorial process that is MTT, and the emotional weighting will relate to an individual's goals. The evidence is quite clear that any process that involves manipulating the contents of memory, whether it be decision making or MTT, will have critical input from the emotional system in the form of emotional weightings attached to the memory images. Previously I have highlighted the considerable evidence for a similar process in generating anomalous intuition, especially through the emotional components of dreaming and the generation of anomalous feelings, including somatic ones (Broughton, 2006). More direct evidence for an involvement of the emotional system in anomalous intuition comes from the line of research known as presentiment studies. (Bierman & Radin, 1997; Radin, 2004, Lobach, E. (this volume)).

It must be emphasized that I am not suggesting that MTT *requires* anomalous intuition. I am suggesting that if we are looking for an evolutionary rationale, as well as evolutionarily designed physiological mechanisms for anomalous intuition, MTT is clearly a leading candidate. This does not mean that somehow anomalous intuition tags memory images to indicate 'your future', but rather anomalous intuition may bias or influence the selection of the particular memories from which we construct our futures in the MTT process. The resulting future scenarios that are considered for the purposes of action or decisions will be indistinguishable from 'normal' intuition, but will have some degree of input from the future via the stage one mechanisms that we have yet to understand.

What is the evidence for an evolved anomalous intuition?

The short answer to that question is, "Not much." This is probably due principally to the fact that parapsychologists have not been inclined to look for evidence that would indicate evolutionary origins of anomalous intuition. If anomalous intuition were evolutionarily determined then we would expect evidence of heritability. There is a long tradition of

anecdotal reports that suggest heritability, and these are backed up by at least one large survey of Scottish 'second sight' (Cohn, 1994). Several independent sets of data from the ganzfeld experiments, mentioned above, have shown a substantial advantage for relatives when they are used as the sender-receiver pairs in those experiments. Parent-child pairs and sibling pairs demonstrate anomalous intuition far better than others do, including spousal pairs (see, for example, Broughton & Alexander, 1997).

Objections to an evolved anomalous intuition

There is one principal objection to the idea that anomalous intuition is a product of evolution that can be summed up in the question, "Why is anomalous intuition not more highly developed and more effective than what we see?" Given geologic time spans and evolution's power to develop exquisite organs that can extract information from so many aspects of our physical environment—electromagnetic radiation, vibration, biochemicals—anomalous intuition should be far more effective at keeping humans out of danger than it appears to be. One philosopher who is convinced of the reality of psi has used the lack of evidence for an evolutionarily honed ability to use psi as evidence for a dualist worldview (Levin, 1996). This sort of argument is based on the dubious assumption that evolution is supposed to work according to a naive notion of what it should produce. Evolutionary psychology is on shaky enough ground trying to deduce evolutionary rationales for existing behaviour (Buller, 2005). It would be even riskier to propose expected behavioural outcomes for evolution.

Several answers can be offered to the above objection. The first is that the anomalous intuition that we observe may be the result of the optimum functioning that can be derived from the underlying mechanism. We have no idea how the stage one process outlined at the start of this paper interacts with human biology, so we have no way of determining how effective this process might be at extracting useful information. What we see of anomalous intuition may be as good as it gets, but that is good enough to constitute an evolutionary advantage.

A second answer is that the observed anomalous intuition is functioning at the level appropriate to an evolutionarily stable strategy (ESS).

In evolutionary theory an ESS is a pattern of behaviour (strategy) which, if employed by all members of society, cannot be bested by another strategy (see Broughton, 1988 for an elaboration in the context of ESP). The balance of how 'effectively' we use anomalous intuition and when we use it may simply conform to an ESS that we have yet to understand.

A final possible answer is that anomalous intuition may not have been evolving so very long. Suddendorf and Corballis (2007a, p. 312) argue that mental time travel may have evolved comparatively recently, principally as a result of an evolutionary 'arms race' of cognitive and social abilities driven by intra-species and perhaps intra-genus competition. If anomalous intuition amounts to a supporting subsystem to MTT, then its evolutionary history may be correspondingly short. It is even possible that anomalous intuition is a competitive evolutionary adaptation for a species that was rapidly developing MTT capability based exclusively on memory.

Conclusions

Anomalous intuition, known by many different names, has been around as long as recorded history, and the substantial amount of scientific evidence that has grown up in recent decades to support its existence suggests that a complete understanding of what we think of as normal intuition will require an understanding of how anomalous intuition fits into the picture. Anomalous intuition need not be seen as something that is paranormal, but rather it is a yet-to-be understood component of the evolutionary tool kit that humans have developed.

Mental time travel, with its immense evolutionary advantage, suggests a clear evolutionary pathway in which anomalous intuition might be located. Anomalous intuition may share key mechanism with MTT (Broughton, 2006), and although the evidence at present is largely circumstantial, it strongly suggests areas in which future research aimed at understanding anomalous intuition should be directed.

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SOMATIC COMPONENTS OF INTUITION AND PSI

Eva Lobach [*]

Introduction

This presentation is divided in three parts.

In the first part I will argue that physiological processes during the decision making process may not only be affected by what we have learned from past experiences, but also by future events, which I will illustrate with experimental evidence.

The second part builds forth on the first part, and describes a recent replication of an experiment by Tressoldi and his colleagues (Tressoldi, Martinelli, Massaccesi, & Sartori, 2005) in our own laboratory at the University of Amsterdam, in which we repeated the original results. These results once again showed that physiological changes are related to future events.

The third part promotes the inclusion of parapsychological hypotheses events in common psychological research. One of our recently completed studies illustrates how this can be done.

1.Two Somatic Sources of Intuition: From the Past and from the Future

Somatic Intuition Based on Past Experiences

We respond emotionally to many events in our environment, and this involves physiological processes throughout the whole body, not just the brain. Physiological responses to events in our environment can be illustrated by common expressions in the English language; events can make 'your hair stand on end', or make 'your eyes pop out', or make 'your heart sink'.

Quite a few of those physiological responses are unpleasant, and our

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evolutionary past has made sure that we strive to avoid unpleasant experiences. This is an inherent basic mechanism. We are born with it.

This general mechanism can be fine-tuned to the specific features of the actual environment we are born into. Inner-city threats are arguably different from those in a tropical forest and we learn to cope with either.

How does this fine-tuning work? Scientists are still trying to discover this, but an approach that has gained a lot of interest is the *somatic marker hypothesis* (Damasio, 1994). According to this hypothesis, unpleasant events link our spontaneous and unconscious physiological responses with perceptual features of the situation, e.g., if we nearly escaped being run over by a car, we will link our pounding heart, sweating, weakness in the knees, with what we perceive as relevant features of the situation, such as the sound of an accelerating car engine, a busy street, etc. When encountering a similar situation, unconsciously recognizing those cognitive features of the situation will, again unconsciously, trigger a semblance of the associated physiological responses ("somatic marker"). Somatic markers will in turn produce a feeling that will bias our choices away from risky ones.

Somatic markers are thus hypothesized to be a central part of the learning and decision making process that helps us to avoid unpleasant, and thus dangerous experiences. Because this bias in our decision making process is generally unconscious, I consider these somatic markers to be a somatic source of intuition, based on past experiences.[1]

Somatic Intuition of Future Events

Our experimental work does not only look into somatic responses based on learning from past experiences. Previous experiments have shown that changes in physiological processes, such as skin conductance, EEG (electro-encephalogram, measuring brain activity), and heartrate, are associated with future events (e.g., Bierman & Radin, 1997; Radin

[1] Although this line of reasoning sounds plausible, and there is experimental evidence supporting this theoretical point of view, the somatic marker hypothesis and the experimental results supporting the hypothesis has increasingly met with criticism (for a review see e.g., Dunn, Dagliesh, & Lawrence, 2006. In My own studies I have so far been unable to detect somatic markers, as were colleagues at the University of Nijmegen, who runs replications of the original experimental task (Witteman, 2010, personal communication).

& Lobach, 2007). These unconscious changes in physiological processes are called 'presentiments'. In these studies, participants sit passively while randomly selected emotional and non-emotional stimuli are being presented to them.

We would only call those somatic changes a somatic source of 'intuition' if they could actually affect our choices. In order to find out whether this is the case, participants need to have the opportunity to act on those presentiments. This opportunity was give by Tressoldi and his colleagues (e.g., Tressoldi, Martinelli, Massaccesi, & Sartori, 2005). In a typical study, four pictures are presented sequentially while heartrate is being measured. Then all four are presented at the same time, and the participant chooses which one of those four would later be picked by the computer as the target. Although Tressoldi et al. (2005) found that heartrate was higher for the pictures that would later be the target, they found that conscious choices did not appear to make use of this difference. This may have been due to the fact that these choices had hardly any consequences; it would not make much of a difference to the participant whether one or another picture would be the target. This explanation was corroborated in later experiments, where Tressoldi and his colleagues did find that heartrate may indeed serve as a warning signal if it can assist participants in avoiding unpleasant stimuli (Tressoldi, Martinelli, Scartezzini, & Massaccesi, in press).

2.Replication of Tressoldi study

In our replication of Tressoldi's original study (Tressoldi et al., 2005), we made a few adaptations to the original experiment. First, we reduced the task to two pictures only as we thought that would make the task more interesting; it would double the average percentage of hits. Second, we reduced the duration of the presentation of each of the two pictures from ten seconds to three. The raw data of Tressoldi et al. showed that effects for target vs. non-target appeared to be limited to the first two seconds of the stimulus presentation, so a longer presentation of the pictures did not seem to be necessary. Third, we increased the number of trials from 20 in the original Tressoldi et al. experiment to 48, in order to increase power.

In addition, we included yoga and meditation experience as an independent variable. Since both yoga and meditation are assumed to enhance sensitivity to bodily processes, we reasoned that increased yoga/meditation experience would be associated with an increased tendency to act on heartrate differences between target and non-target.

Method

Participants. Participants in this study (N=36, 21 women) were partly found among friends and colleagues of the experimenters, and partly among students and teachers of yoga and meditation.

Stimuli presentation. Stimuli were presented with the software package Presentation (Presentation Version 14.1, Neurobehavioral Systems, Inc.). Pictures were randomly picked from a pool of 98 stimuli, and the target was determined randomly using the randomization feature in the Presentation software [2].

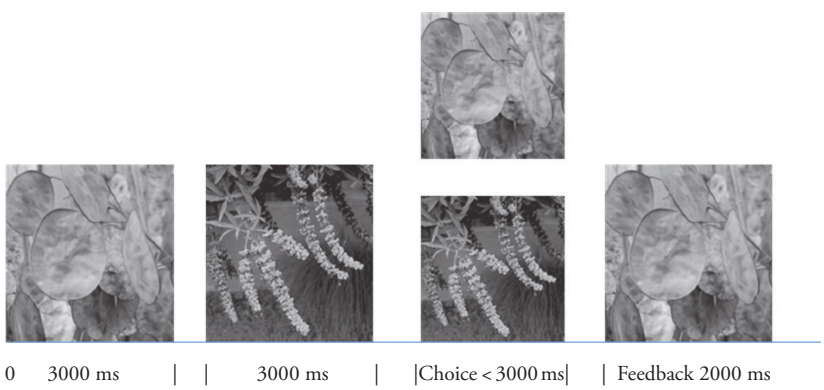


Figure 1. *Trial sequence*. Two pictures are presented one at a time for 3 seconds each. Then both are presented simultaneously and the participants chooses within 3 seconds which one is the target. Then feedback shows the actual target for 2 seconds.

[2] Presentation documentation with Presentation Version 14.1 describes the randomization as follows: The Presentation random number generator is based on the ran1 algorithm described in Section 7.1 of the book "Numerical Recipes in C". The "Minimal Standard" generator used by Presentation for this algorithm is actually the rad() function of the C Standard Library.

Heartrate signal. Heartrate was measured using a Biosemi ActiveTwo AD-box with Actiview acquisition software, and four active electrodes. Two electrodes were placed on the earlobes; one was placed directly left of the chest bone, and another in the right side, directly under the lower rib.

Results of the replication study

Target/Non-Target. While looking at the picture that would later be the target, heartrate was higher than when looking at the non-target picture (73.59 (*sd 1,97*) beats per minute vs. 73.41 (*sd 1,96*) beats per minute) (Fig.2). The difference in pre-choice heartrates was statistically significant, $F(1,35) = 5.51$, $p = .026$, partial $\eta^2 = .14$.

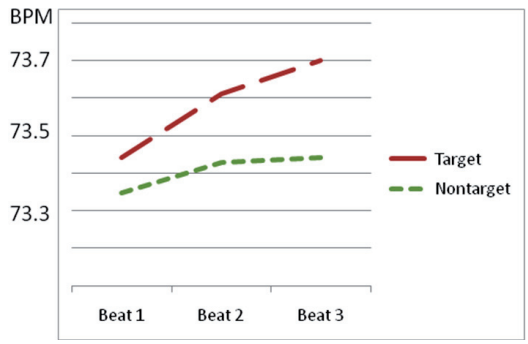


Figure 2. Heartrate (in beats per minute) during the first three heartbeats while looking at the picture that would later turn out to be the target (long dashes) vs. the picture that would later turn out to be the non-target (short dashes).

Conscious choices and heartrate changes. The conscious choices were at chance level, and there was no indication that heartrate differences for target and non-target were related to the future choices.

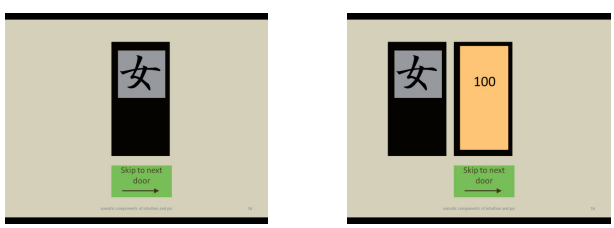
Yoga/meditation experience. There was no effect of yoga and meditation experience on either the pre-choice heartrate changes, the use of those changes in subsequent choices, or the average number of correct choices of the target.

3. Combination of Psychological and Parapsychological Hypotheses into one Experimental Design

Including hypotheses of paranormal effects into common psychological experimental designs has the obvious advantage that we will be able to estimate the relative contributing effects of psi and non-psi factors on human behavior. Moreover, the more these hypotheses are included in common psychological experiments, the more we will be able to learn about factors that are related to psi-effects, and test theoretical models.

Example of a Combined Psi and Psychological Experiment: The Intuition Door Game

Method and Hypotheses. The Intuition Door Game was designed to investigate the pre-choice somatic effects of past experiences, pre-choice effects related to the actual decision (irrespective of past experiences), and somatic changes associated with unknown future events. In this study, participants play a game in which they have the opportunity to increase their total score by opening doors that are presented on the screen. Only one door is presented at a time. With each door, they have the choice to open the door, after which it slides open and reveals either a positive (+50 or +100) or a negative reward (-50 or -100), or they can choose to skip this particular door and go on to the next door. There is no limit to the number of doors that can be skipped. However, as soon as the participant has opened 75 doors, the game is over.



(a) (b)

Figure 3. The screen showing the door, (a) before opening the door, and (b) after the participant opened the door, in this case revealing a positive award.

There are three types of doors, each with a different Chinese character: a positive door with a 70/30 percent probability of a positive reward, a negative door with a 30/70 percent probability of a positive reward, and a neutral door with a 50/50 percent probability of a positive reward. Chinese characters are counterbalanced across reward probabilities. During the whole game, heartrate is being measured.

There were three hypotheses:

- *Somatic marker hypothesis:* We expected that participants will learn from feedback and will decide to increasingly skip the negative doors and open more positive doors. This is a simple learning effect. Based on the ideas proposed by Damasio (e.g., Damasio & Bechara, 1997), we would expect somatic markers to guide those decisions even before there is conscious knowledge about the reward probabilities of the three different doors. We would therefore expect that in the course of this game, participants' heartrate will start to relatively slow down more when seeing a negative door than when seeing a positive door.

- *Somatic choice hypothesis:* In previous experiments, we found that heartrate indicated what a participant was going to decide, irrespective of whether or not that decision was advantageous or not (e.g., Lobach & Bierman, 2007). In other words, if the participant has two options, heartrate was relatively increased when looking at the stimulus they decided to choose. A similar result was recently reported for pupil dilation (Einhäuser, Koch, & Carter, 2010), where pupil size was increased while looking at the option that the participant would choose. In line with these previous results, we expected a relatively increased heartrate when participants decide to open the door than when they decide to skip it.

- *Presentiment hypothesis ("psi"-hypothesis):* Based on previous presentiment results, where pre-stimulus heartrate was slower for negative stimuli than for positive stimuli, we expected heartrate to be slower before the -100 reward than before the +100 reward.

Results of the Intuition Door Game

- *Somatic Marker Hypothesis.* During the course of this game, participants increasingly skipped the negative doors, and increasingly opened more positive doors, indicating the expected learning effect, $F(4,188) = 4.09$, $p = .003$ (Figure 3).

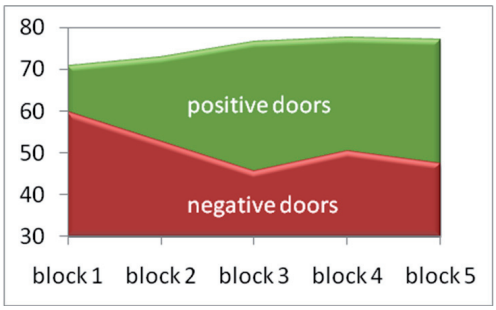


Figure 4. Average percentages of positive and negative doors opened in block 1 through 5.

However, in none of the 5 blocks did we find any indication that somatic markers were triggered by the reward probabilities of the doors.

- *Somatic Choice Hypothesis*. As in earlier experiments, pre-choice heartrate deceleration was significantly less when participants decided to open a door than when they decided to skip it, $F(2,94)=6.37$, $p = .003$, *partial* $\eta^2 = .119$ (Figure 4).

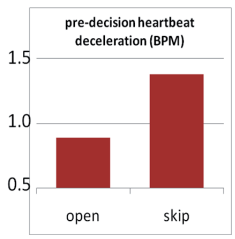


Figure 5. Pre-decision heartrate deceleration in beats per minute before the decision to open a door ('open') and before the decision to skip this door and go to the next door ('skip').

- *Presentiment hypothesis.* We expected heartrate to be slower before a negative reward was revealed than before a positive was revealed. This is indeed what we found, $t(37) = 1.90$, $p = .03$ (*one-tailed*), see Figure 5.

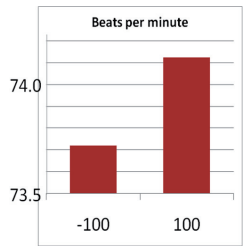


Figure 6. Average heartrate (beats per minute) just before a negative (-100) or a positive reward (100) is revealed.

Conclusion

The results shown above and those of other experiments indicate that *future events* are associated with physiological processes in the present. There is still no clear evidence that these physiological changes do indeed affect our conscious decisions.

At the same time, learning to discriminate between positive and negative choices does not seem to be assisted by physiological changes (somatic markers) associated with *past events*. Our results did thus not support the somatic marker hypothesis.

There is, however, increasing evidence that pre-choice physiological changes, such as a relatively higher heartrate and a more dilated eye pupil indicate which option will be chosen, irrespective of previous positive or negative feedback associated with that option.

Incidentally, both increased heartrate and dilated eye pupil may indicate a relatively decreased activity of the parasympathetic nervous system. This decreased parasympathetic activity may thus be the underlying system that affects both eye pupil dilation and heartrate increases.

Part of the presented evidence originates from one of our recent experiments in which we included both psychological and parapsychological hypotheses. In many cases, it can be relatively easy to combine the two types of hypotheses, especially in studies that include physiologi-

cal measurements. While psychologists look for effects in a linear time frame, where causes precede effects, it is in general rather easy to explore reverse effects, where behavioral or physiological changes precede the alleged causes. Often, the data are available; it only needs a change of perspective. Including the two types of hypothesis in one experimental design may help us get a better idea of the relative contributions of psi and psychological factors involved in human behavior. In addition, these results may be of interest to physicists who study the nature of time.

A broadening of the perspective among mainstream researchers is a development that in itself may be linked intimately – but outside our conscious awareness – to those future developments. From our limited conscious perspectives, however, we will just have to wait and see.

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THE REACH OF MIND: BRIDGING SCIENCE AND POPULAR CULTURE[1]

Marilyn Schlitz [*]

"Much of the work of the brain consists of hiding its work from us."
Richard Powers, *The Echo Maker*

Never before this moment in history have so many worldviews, belief systems, and ways of engaging reality come into contact. On the one hand, we now have access to the world's wisdom and spiritual traditions-traditions that cultivate interiority and subjectivity, and that have begun to harness and develop intuition. On the other hand, there's this burgeoning of a new way of engaging subjectivity using western science and its objective methods. We see a kind of rapprochement between these various ways of knowing, that ultimately can lead to a greater understanding of who we are and what our capacities are as people.

At the same time, it's a confusing moment. There are many competing truth claims, and sometimes it's very difficult to figure out what is so. When considering the various epistemologies, one of the challenges we face is how to decide the relative truth of these different approaches and methodologies. Embracing differences provides opportunities for greater synthesis of paradoxical perspectives and builds an ontological foundation for creativity, coherence, resonance and synergy. In this historical moment, popular culture often embraces many of these truth claims in ways that lack discernment, while conservative academics guarding the bastions of science sometimes discourage inquisitiveness or openness to new ways of thinking that challenge existing paradigms. The cognitive neurosciences are discovering that, in some ways, we're actually hardwired to resist new information. Our capacities to make decisions and to

[1] I want to express my appreciation to the Bial Foundation for its steadfast support of research conducted at the Institute of Noetic Sciences and its strong belief in the importance of cutting edge science that explores the impact of consciousness on matter. I thank Caroline Watt and Dick Bierman for organizing this panel, and Charlene Farrell for helping in the production of this paper.

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navigate our lives often lie below the threshold of conscious awareness. And so, how do we begin to understand and harness these capacities, when in fact they rest below the portal of our conscious experience?

What are the characteristics or qualities that people describe when they think about intuition, or when they report their own subjective experiences related to intuition? How can we bring these experiential, non-logical dimensions into the scientific domain? At the Institute of Noetic Sciences, we've been interested, along with other colleagues over the years, in examining a variety of these kinds of truth claims including that sense of direct knowing or the experience of something that is not rational or linear. For example, people commonly report the perception that someone is staring at them. A person may be, driving in their car or sitting in a park when they get an uneasy feeling of tingling up the back of the neck—or hair standing on end. They sense that somebody is looking at them and maybe they look over to find that, indeed, someone is staring at them. These experiences include different kinds of autonomic responses that bring events from below the threshold of conscious experience into our awareness.

The word Noetic, which comes from the Greek "nous," concerns this sense of direct knowing. The Institute of Noetic Sciences was founded by one of the Apollo 14 astronauts, Edgar Mitchell, who, as he was co-ming back from the moon, had a direct Noetic experience of a kind of universal connectedness. As an MIT-trained engineer, he also respected and appreciated the rigor and discernment that comes from science. For almost four decades, the organization has been dedicated to building a bridge between inner authority, that aspect that drives us and that defines the qualities of our human experience, and the kind of rigor that comes with western science. At the Institute of Noetic Sciences, we have a small psychophysiology lab with a 2,000 pound electrically shielded room that allows us to begin to integrate this subjective experience with objective markers. Once the door to our electromagnetically shielded box is closed, there's no possibility of any kind of conventional electromagnetic communication between the two people. This allows us a degree of confidence that our results cannot be explained by conventional sensory communication.

Within this paradigm, we've conducted experiments exploring the mind-matter interface in various ways. The majority of our experiments in-

volve monitoring the physiology of a person in the shielded room, while we simultaneously have a person in another room, watching the image of the person in the room by closed circuit television. The idea is to see if, while using a randomized counterbalanced design, it is possible for the intention of a person in one room to correlate with the physiology of a person in the other room without any sensory communication between them. When the image of the person comes up on the closed circuit television, the job of the "sender" is to wake the person up, or get their attention. It involves mentally attempting to connect with that person. This paradigm has been articulated as a kind of sender-receiver information transfer, when in fact, as Dick Bierman describes in his presentation, it's much more about a kind of entangled system in which we are measuring a potential correlation between the intention of one person and the physiology of the other.

During an experiment, we have "intention" periods and "non-intention" periods. We average the physiological activity in these two different conditions, and then do a statistical comparison between them. This creates a straightforward way of assessing whether the person in the receiver position is able, intuitively but not consciously, to know when those sending periods occurred. In a single session, we can look at the differences in the averages of physiological outcomes and then combine these for each session.

These experiments have also been done in a variety of other laboratories by different investigators. Stefan Schmidt and a group at the University of Freiberg (Schmidt, Schneider, Utts & Walach, 2004) conducted a meta-analysis of all experiments that had been conducted up until 2004 in order to be able to assess replication and consistency of the effect over time. This analysis showed a small but statistically significant difference in the overall activity between these two sets of conditions. The implication of Schmidt et al.'s meta-analysis is that, under this kind of random, double-bind protocol, there is some kind of anomalous communication between two people, and that there is this kind of entanglement in which the intention of one is reflected in the intuition of the other.

In a paper entitled "Distant Healing Intention: Definitions and Evolving Guidelines for Laboratory Studies" (Schlitz, Radin, Malle, Schmidt, Utts & Yount, 2003), my colleagues and I explored evolving protocols for conducting this type of laboratory research. We note that:

> In essence, DHI differs from other alternative healing modalities in that it postulates that mental intention alone can affect living systems at a distance, unbounded by the usual constraints of both space and time.
> This postulate challenges scientific assumptions that often go unexamined, including the nature of causality, the distinction between subjective and objective states, and the efficacy of double-blind protocols in controlling for experimenters' intentions (Schlitz et al., 2003, p. A31).

Although previous laboratory research in this domain suggests that DHI effects warrant serious study, most scientists and funding agencies remain unaware of the evidence or the relevant literature. Both alternative healing in general and distant healing in particular enjoy broad public support but have largely eluded serious attention by mainstream science. We stress that it is essential that research design adhere to evolving guidelines in order that future publications will conform more closely to the quality standards expected by scientific journals and thereby attract a broader range of scientific interest.

Let's consider some of the phenomenological experiences that people report when they describe intention. In addition to remote staring, we often hear claims of individuals from many domains who make decisions based on gut feelings. We hear stories of successful business people making investment decisions, or healthcare practitioners somehow intuiting diagnosis or a feeling about the most effective treatment course. People describe experiences of being able to direct intention resulting in transpersonal healing. These phenomena are not confined to the realm of the mystic but are a part of our experiential framework and our everyday lived experience. When we measured these autonomic responses in the laboratory, we found that, in fact, people's physiology responded differently during the intention periods compared to the control periods.

Another experiment we conducted involved measuring activity in the enteric nervous system, or simply put, "gut reactions" (Radin and Schlitz, 2005). The gut is highly sensitive to emotions. People commonly describe the "punch in the stomach", "butterflies in my stomach", that "gut feeling", or "warm glow". We began to explore the possibility that the experience of

intuition is reflected not only in the electrodermal activity of the skin, but also in changes in the electrogastrogram. We were interested in exploring whether this would be a useful way of studying emotions at a distance.

In this study, our objective was to investigate whether the gut feelings of one person, as measured with an electrogastrogram (EGG), respond to the emotions of a distant person. Using a double blind protocol, we recorded EGG in an individual relaxing in a heavily shielded chamber while a second person, at a distance, periodically viewed the live video image of the first person along with stimuli designed to evoke positive, negative, calming, or neutral emotions.

Research subjects included 26 pairs of healthy adult volunteers. We compared EGG maximum values recorded while the distant person was exposed to emotional stimuli to similar values recorded during exposure to neutral stimuli. We found EGG maximums were significantly larger on average when the distant person was experiencing positive ($p = 0.006$) and negative ($p = 0.0009$) emotions, as compared to neutral emotions. One curious exception to this phenomenon was that these larger amplitudes did not apply to anger. This phenomenon calls for follow up study. We employed nonparametric bootstrap procedures to evaluate these differences; the results survive correction for multiple analyses. The results appear to support the hypothesis that one person's gut feelings can respond to a distant person's positive and sad emotions. EGG activity increased in response to the emotions of a distant person beyond the influence of ordinary sensory interactions. Relationships commonly reported between gut feelings and intuitive hunches may share a common, poorly understood, perceptive origin. We conclude in the paper on this study:

> This experiment suggests that some somatic feelings may be associated with perceptions transcending ordinary sensory capabilities. Of course, it would be imprudent to assume that all gut feelings necessarily contain intuitive information, as on occasions visceral sensations reflect little more than a bad burrito. But assuming that future studies can successfully replicate the present results, it may turn out that the "belly brain" is more perceptive than previously suspected, and that common reports of gut feelings having special intuitive qualities may have a basis in fact (Radin & Schlitz, 2005, p.90).

In another experiment conducted in our lab (Radin, Stone, Levine, Eskandarnejad, Schlitz, Kozak, Mandel, & Hayssen, 2008), we looked at two things. One was the level of relationship between the two people, and the second was the idea that there was some kind of need or motivation. In the double-blind study, which we informally call The Love Study, 36 couples participated in 38 test sessions. In 22 couples, one of the pair was a cancer patient. In 12 of those couples, the healthy person was trained to direct compassionate intention toward the patient and asked to practice that intention daily for three months prior to the experiment (trained group). In the other 10 couples, the pair was tested before the partner was trained (wait group). Fourteen healthy couples received no training (control group). We investigated the effects of intention on the autonomic nervous system of a "sender" and distant "receiver" of those intentions, and explored the roles that motivation and training might have in modulating these effects. Each member of a couple was asked to feel the presence of the other. We measured skin conductance for each. While the receiving person relaxed in the distant shielded room for 30 minutes, the sending person directed compassionate intention toward the receiver during repeated 10-second epochs separated by random interepoch periods.

We again used nonparametric bootstrap procedures to compare normalized skin conductance means recorded during the intention epochs with the same measures recorded during randomly selected interepoch periods, used as controls. The preplanned difference examined the intention versus control means.

We found that: "Overall, receivers' skin conductance increased during the intention epochs ($z = 3.9$; $P = .00009$, two-tailed). Planned differences in skin conductance among the three groups were not significant, but a post hoc analysis showed that peak deviations were largest and most sustained in the trained group, followed by more moderate effects in the wait group, and still smaller effects in the control group." (Radin, et al., 2008, p. 235) We conclude that directing intention toward a distant person is correlated with activation of that person's autonomic nervous system. Strong motivation to heal and to be healed, and training on how to cultivate and direct compassionate intention, may increase this effect.

Another aspect of intuition that we studied involved a sense of con-

nectedness. Nondual meditators, for example, describe an experience of unitive consciousness, involving a sense of transcendence of conventional space and time parameters. One of IONS recently completed studies compared the experience of nondual meditators and nonmeditators on a kind of presentiment (knowledge of the future) task.

To investigate objective correlates of these impressions, 32 channels of EEG in eight advanced meditators and eight matched non-meditators were examined before two types of randomly presented stimuli. Each subject was exposed to unpredictable flashes of light or audio tones, and slow cortical potentials (SCP) were examined one second prior to those stimuli. Across all subjects significant differences in the distribution of SCP were observed before light vs. audio stimuli, primarily in occipital and right parietal regions. Differences were stronger in the meditation group as compared to the non-meditation group. Fourteen of 32 channels in the meditation group exceeded $p < 0.05$ (evaluated via nonparametric bootstrap and corrected for multiple testing), of which 5 exceeded $p< 0.0001$. This study conceptually replicates prior experiments, supporting the existence of anomalous anticipatory effects associated with subjective impressions of timelessness." (Radin, Vieten, Michel & Delorme, in preparation)

Finally, we have sought to translate our studies of intuition and multiple ways of knowing to an educational model. In our Worldview Literacy project, we are working on translating some of the concepts we've discovered in our basic research into applications that hold tremendous potential for transformation. We're interested in the concept of worldview, and how it is that people have the capacity to transform their personal worldview.

Current research data are showing that we're hard wired to resist new information or data-especially if it refutes our presuppositions. Priming that happens below the threshold of conscious awareness often directs, motivates and pushes us toward certain kinds of behavior. With awareness comes choice. The goal of this research and educational program is to create an experiential learning curriculum. We seek to cultivate basic skills and qualities of mind that help students to question assumptions, make choices with greater discernment, enhance their capacity for inner listening and intuition, expand their appreciation of multiple world-

views, and broaden their sense of interconnectivity in order to enhance their ability to handle the paradoxes of multiple ways of knowing. Ultimately, the goal is to help students thrive as global citizens.

In conclusion, I will end with the quote: "It's through science that we prove, but through intuition that we discover." What I want to suggest, as a result of this conference, is that it's both. It will be by building a bridge between what we know from our rational intellectual reasoning capacities, and appreciation for our experience and our inner authority, that we will ultimately be able to facilitate breakthroughs in our understanding of the potentials that lie within us. It is through this kind of dialogue, debate, and critical assessment of what is true in the various truth systems that we will ultimately be able to discover our full capacities.

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THE POTENTIAL ANOMALOUS COMPONENT OF INTUITION: EMPIRICAL EVIDENCE AND AN INTEGRATED THEORETICAL APPROACH[1]

Dick Bierman *

Introduction

Two words in the title deserve some explanation. First the word 'potential' in 'potential anomalous component'. Before one can call a phenomenon anomalous, which is an extraordinary claim, one needs to have extraordinary evidence. Although there is cumulating evidence I do not think we are in the position to say we are sure that there is an anomalous component in intuition. But we have enough data supporting that hypothesis to explore potential theoretical explanations.

The second reason to call the phenomena potentially anomalous is that it is my intention to show that physics is able to accommodate these phenomena without any alteration to physics. So they wouldn't be anomalous because they would fit in present day physics.

The second word in the title that needs some elaboration is the word 'integrated' in 'integrated theoretical approach'. I strongly belief that we should integrate the study of anomalous phenomena with main-stream science. Not only by using similar experimental paradigms that allow for the study of normal and paranormal aspects in a single experiment but also when trying to develop a theoretical framework.

I therefore will start with a main-stream qualitative model of intuition. It will be illustrated by the famous gambling experiment that origi-

[1] This manuscript is not an article but a report of the oral contribution at the symposium. It therefore does not follow the conventions that are generally valid for articles. The figures are snapshots of the PowerPoint slides. There are no references and experimental procedures are not described in detail. However much detail and almost all references can be found in:
Bierman, D. J.(2008). Consciousness induced restoration of time-symmetry. A psychophysical theoretical perspective. *Conference proceedings of the 51st Convention of the Parapsychological Association*. Winchester, UK. (also available at: http://m0134.fmg.uva.nl/publiations/2008)

* University of Amsterdam, the Netherlands.

nally was done by the research group of Antonio Damasio.

Then I'll argue that this model can be extended to accommodate the anomalous component of intuition, if any, that has been labeled by the word 'presentiment'. That theoretical extension supposes a violation of causality.

It should be remarked that violation of causality cannot only account for say presentiment effects but actually for all 'paranormal' phenomena: telepathy, clairvoyance, precognition and psycho-kinesis.

I will argue that, contrary to common belief, physics can accommodate this violation of causality. This will be done explaining the status of time-symmetry in physics and it will be argued argue that time-symmetry is generally not observed in physical systems because the boundary conditions do prohibit this. However time symmetry occurs in relation with highly coherent systems like our brain while producing unified consciousness.

Result of a recent experiment will be presented in order to support this claim. This particular experiment shows signs of causality violation in a non emotional setting: the observation of a so-called Necker cube.

Finally individual differences will be discussed in this theoretical approach equating brain coherence with the coherence needed to observe time-symmetry and this is illustrated by some data of a meditation study of presentiment.

A main stream model for intuition: the somatic marker

Imagine that a chess player is considering what move to make. There are a number of options to choose from. Naively we think that the chess player is quite good in analysis and that a deep analysis results in a choice. From thinking aloud protocols we learned that the analyses is preceded by another process.

In the past the chess player has played hundreds and studied thousands of games. In many of those there have been similar positions on the board. And he has experienced the outcome of many different possible moves. A number of those moves were clearly winning, others resulted in loss. Good or bad outcomes. So some emotional marking has taken place. Most of this information is probably not accessible by explicit searching

through memory. But it is assumed that it is learned implicitly. So the first part of the model assumes that implicit learning has occurred where the potential moves space have been marked with positive or negative affect. The model then assumes that in the case of a similar position on the board this implicit knowledge is activated and also the associated emotional labeling. Emotions are associated with bodily sensations. So when a solution pops up the relevant somatic sensation might be felt. But actually we assume these negatively labeled moves are already excluded nonconsciously. So basically this process results in a number of moves that haven't been labeled as bad moves. Now the analytic conscious processing is limited to the reduced set of possible moves that had no negative consequences in the past. Calculations can now begin. (see figure 1)

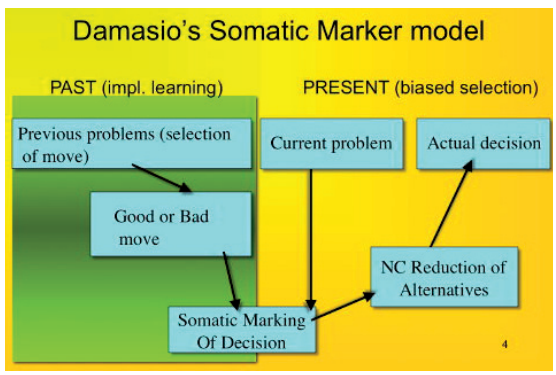

Figure 1. Schematic of Damasio's Somatic Marker model

If one asks the chess player why he didn't calculate another, at first sight reasonable, move, he might answer that it doesn't feel good. If one keeps asking he might in the end remember that in a game between Botwinnik & Aljechin in 1932 this move turned out to be disastrous.

The big advantage of the non-conscious filtering is that it can occur in parallel, the biggest disadvantage is that it might fail.

A long time ago I talked with Smislov a former chess champion. At the time he was already old but still played at grandmaster-level. He told me that he had stopped the calculating part and played just on his feelings or intuition.

The gambling experiment

This Somatic Marker model is claimed to be supported by gambling experiments of the Damasio group. In these experiments there are 4 decks of cards. Unknown to the subjects 2 of those decks are disadvantageous and the other 2 are advantageous. The task of the subject is to take cards of any of these decks. They know nothing bout the decks. They have to gamble, for them this is just a gambling experiment.

The participants start with 2000 in artificial money. They take then a card from 1 of the 4 decks, turn the card around and see the backside on which is indicated the amount of money they win or loose.

During the whole task the skin conductance is measured. Skin conductance correlates with the state of arousal. There are three periods in a trial. First the subject prepares to take a card, then he takes the card, then the card is turned around and on the backside there is feedback in terms of a monetary reward or punishment. (see figure 2, lower panel)

Damasio used two groups of participants. One group consisted of patients with specific brain damage that didn't affect their intelligence.

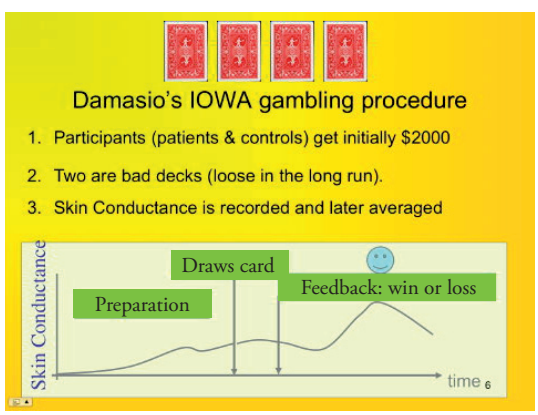

Figure 2. Major aspects of the IOWA gambling task and an example of the skin conductance during one trial.

What was found was not only that normal subjects take more often from good decks than from bad decks even when they were claiming that were choosing randomly but also that in the preparation phase, just pre-

ceding taking a card from the bad decks, the skin conductance increased compared with just before taking a card from the good decks. This effect in skin conductance was absent in the patients. In normal subjects skin conductance produced a kind of a warning signal that was called the somatic marker. So in this experiment implicit learning as well as somatic marking occurred. That was Damasio's interpretation.

There has been strong criticism on Damasio's experiments and on the interpretation thereof. However in our own research using pupil dilation rather than skin conductance we found support for this model and we have observed that when looking at a bad alternative and having an increase in pupil dilation resulted in not choosing that alternative, indicating that indeed the somatic marker had an impact on the (intuitive) decision.

The gambling experiment revisited.

We have heard in several contributions to this symposium that an anomalous effect called 'presentiment' might play a role in situations where one has a future emotion. Can we extend the somatic marker model in such a way that this phenomenon is integrated?

That is possible indeed by extending the model into the future.

A part from the past experience that drives a decision in Damasio's model it is the future experience that drives the current bodily process reflected in for instance the skin conductance in the extension. But this increased explanatory power of the extended model comes at first sight at a high price as can be seen in figure 3.

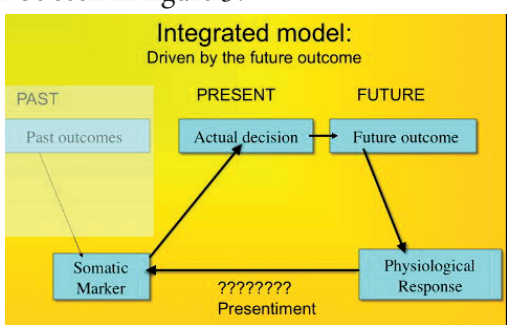

Figure 3. The extended SM model

The future outcome of a decision creates a bodily response that then becomes also a source for the decision or the physiology when the decision is made. So there is a kind of symmetry between future and past.

The price is that this model contains an arrow that runs against the normal time.

And at first sight this looks like a revolutionary, nay impossible, step. Could there be final causality (as it been called by the Greek philosophers).

Here is the naïve response to such a proposal: Of course this is impossible. It undermines the whole scientific building. Because all scientific models (except some parts of QP) seem to be formulated in terms of cause and effect where cause precedes the effects.

So if one proposes such a revolution one has also to present overwhelming evidence. Let me say that I don't believe we are there yet. And there might be good reasons that it is difficult to get there. Not the least one is that a causal effect from the future might result in paradoxes (as you can see in the closed loop of arrows) and these paradoxes should be avoided when one proposes a theory.

However there is accumulating empirical evidence for this anomaly and …interestingly we might use the results of Damasio's own gambling experiment to find evidence for presentiment!!

In order to understand this we should have a look at the procedure that is generally used in presentiment experiments. First of all there should be a random event in the future with two possible outcomes. One of those should be a positive or neutral the other negative. This is exactly what I happening in the gambling experiment because the actual result of taking a card from whatever deck is winning or loosing. Damasio averaged all skin conductance in the preparation period over bad decks and over good decks and then compared these two averages. Rather than averaging per type of deck we average for all decks per type of outcome: winning or loosing.

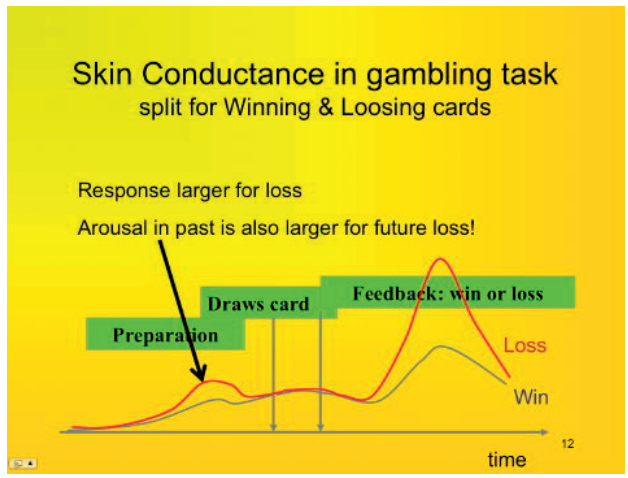

Figure 4. An illustration of the average time course of skin conductance preceding taking a loosing and before taking a winning card.

The results of this re-analysis turn out to be marginally significant (see figure 5) and I should note warn that the randomization that Damasio used was inferior to what is custom in psi research. But for the sake of argument let us assume that presentiment is real and hence we have to deal with some apparent violation of causality.

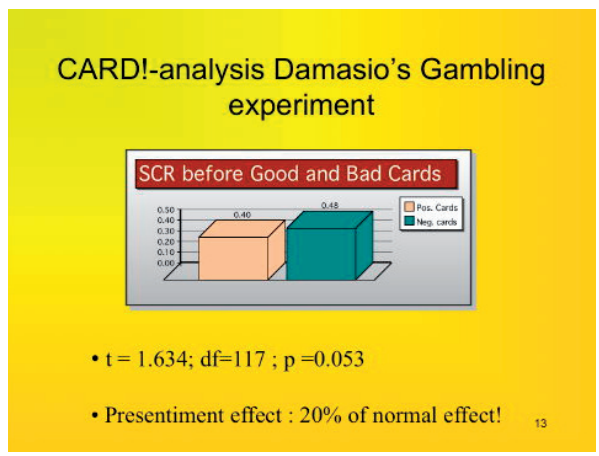

Figure 5. Resuls of re-analysis of the IOWA gambling task

All paranormal effects 'explained'

The traditional causal telepathy model was that was formulated was a 'third eye' (or a sixth sense) scanning all the information in the world and selecting what was relevant for the organism. This is a daunting task if one has limited information processing capacity as we humans do. However in the extension to Damasio's main stream model, that is discussed here, the computational demands are very limited.

Rather than scanning all information in the cosmos, telepathy only occurs because in the future there will be feedback which then reflects into the present backwards in time. In this way the computational demand issue is solved because processing is limited to future events. In fact there is no computational demand other than that for processing the feedback. Actually the whole idea that we have some kind of mysterious information transfer, an idea that is still hold strongly in the community of psi researchers, is invalid.

The same arguments hold for other psi phenomena, like clairvoyance and of course precognition.

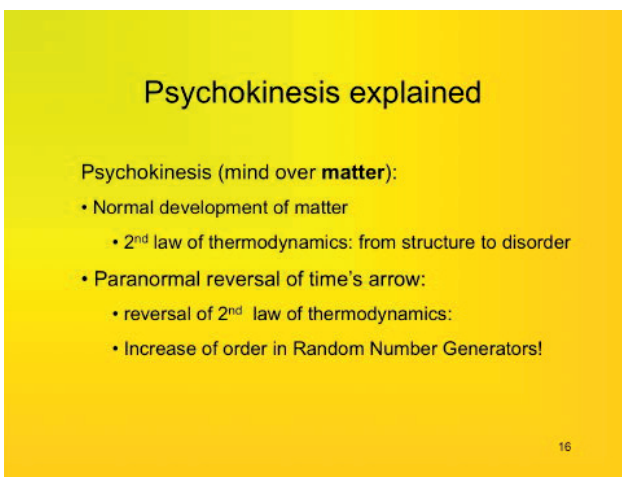

Figure 6. Fitting PK in a model with time-symmetry

Psychokinesis seems, at first sight, difficult to account for. However in physics a reversal of the arrow of time results in increase of order, a ran-

dom number generator becomes non random. And that is exactly what happens in (micro) PK experiments. In fact on an abstract level psi effects can be seen as correlations and correlations do result in more structure, in that sense a telepathy experiment measures a structure (correlation) that seems not to have an underlying 'cause'.

Can physics accomodate psi phenomena?

The obvious objection to this model is that it is theoretically impossible. And when this is said what is actually meant is that physics doesn't allow this 'time running backwards'.

However this is not true. The reason is that most of physics is inherently time-symmetric. What does that mean?

Well let's have a look at Maxwell's theory of EM. This theory boils down to a set of (differential) equations. These equations have to be solved for specific cases. The specific case is defined by *initial* and *boundary* conditions.

It turns out there is not a single solution for these set of equations, there are TWO solutions. One is called the retarded solution, the other is called the *advanced* solution. In the advanced solution 'time is running backwards'.

Most physicists think that this is a quirk of the mathematics that have been used. They claim that they never observe the advanced solution in their physical experiments. So it doesn't exist. However a number of famous theoretical physicists do not agree and have treated these advanced waves as a real entity (see figure 7).

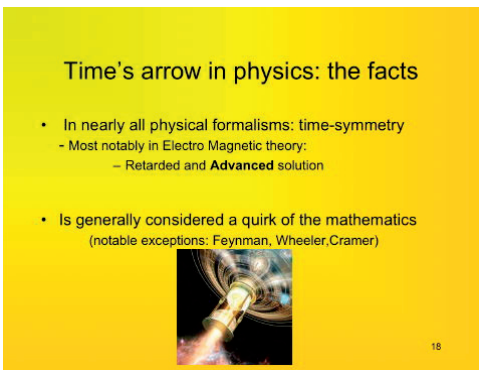

Figure 7. Physical formalisms are time-symmetric

Now the hypothesis that we have proposed is as follows:

The fact that advanced solutions do not occur in simple physical systems is due to the simplicity of the boundary conditions. However if there is a brain involved, and especially a brain that is sustaining consciousness, we do have extremely complex boundary conditions. We have physical theories for the extremely small, the extremely large, we propose that for the extremely complex, the boundary conditions are such that advanced waves become a real solution.

The hypothesis further holds that the system not only should be complex but also in an extremely coherent state: The more coherent the information absorbing system like our brains, the stronger the contribution of the advanced solution. Within this model, individual differences therefore may be accounted for by differences in the coherence of the brain states.

In main stream consciousness research one of the issues is the so-called binding problem: How is it possible that all these separate information processes do result in a unified experience: This unification requires some form of binding and hence some form of coherence. In treating advanced waves Feynman and Wheeler suggested that coherent systems play a significant role. We are not claiming that we are dealing with the form of coherence that Feynman and Wheeler were talking about but use their treatment as a metaphor to support our search for an underlying factor that can account for individual differences.

One could wonder if there are ways to test this proposition.

The crucial point is that physics can accommodate time reversal in the form of time symmetry but why should that only occur when emotion is involved as is the case in for instance the gambling experiment?

Of course emotions might play a role by their stronger future responses. But in principle these time-symmetry effects should also occur in non emotional situations.

The Necker cube experiment

If we present a transparent view of the cube on a screen an interesting phenomenon occurs: Participants experience the cube from above (top-view) for some time and then it switches spontaneously in a view from the bottom (bottom-view). So nothing changes on the screen but

something changes in the experience of the viewer. You can try it yourself. This is called a bistable percept (see figure 8)

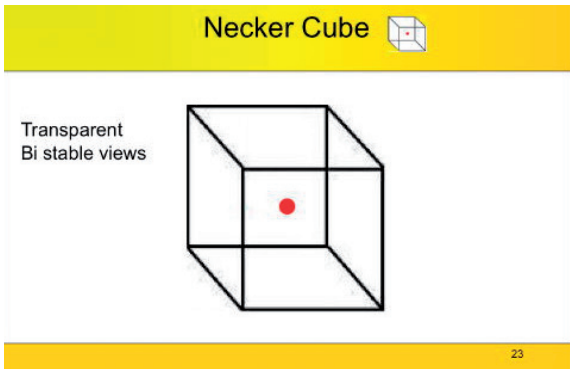

Figure 8. A Necker Cube

There is a lot of literature on why and how this happens but that is not relevant for our experiment, not yet.

The subject has to wait for some time. He might experience a few switches from top-view to bottom-view and vice versa. Then at some point the subject has to press a button when a switch from bottom to top view occurs. And then he has to press the button again when the next switching back occurs. So what we measure is the time that the top view is experienced.

And now comes the manipulation. As soon as the computer has registered this duration of the top view perspective it presents a *non transparent* view of the cube (see figure 9), randomly the top-view or the bottom-view.

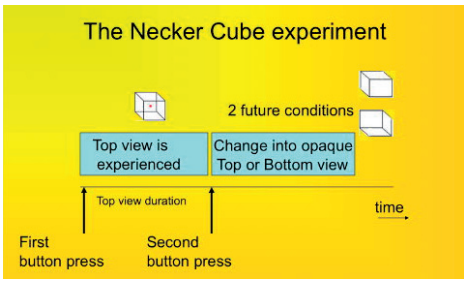

Figure 9. Two conditions in the Necker Cube experiment.

According to normal causality this manipulation should have no effect on the already measured top-view duration.

However it has. In two independent experiments, one at the University of Groningen and one at the University of Amsterdam there is a combined mean difference of this top view duration of 129 milliseconds due to the two future conditions (see figure 10).

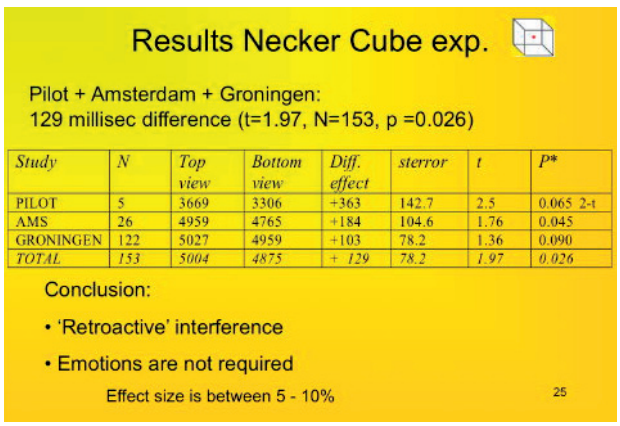

Figure 10. Results of the Necker Cube experiment

We can only explain this if we assume a violation of causality. Rather than calling this presentiment one could call this retroactive interference. This adds to the growing number of retroactive paradigms like retroactive habituation and retroactive priming.

And apparently these effects occur in non emotional context. Emotions are not required. The effect size is the magnitude of the anomalous differential effect divided by the normal effect mean switch duration. This effect size seems to be a bit smaller than those obtained in presentiment experiments. So emotions may play a role.

Individual differences

As usual in behavioral experiments there are strong individual differences. Some participants don't show the effect others show a much stronger effect. Partly this is due to uncontrolled variables for instance

in noise of the vigilence of the subjects. In the model there is only one variable that explicitly might explain individual differences, namely the coherence of the brain state of the subject. This concept has different operationalizations in neurophysiology, these might be different from the concept as it is defined in physics. However, for the sake of exploration we assume that long time meditation produces a more coherent brain state. Thus it makes sense to compare meditators with a control group. That is exactly what we did in an fMRI study where we used the standard presentiment paradigm with neutral and emotional pictures. The most striking result is given in figure 11. The dependent variable is the number of anticipatory peaks when we average the BOLD signal per subject separate for the three conditions (violent, erotic or neutral pictures)

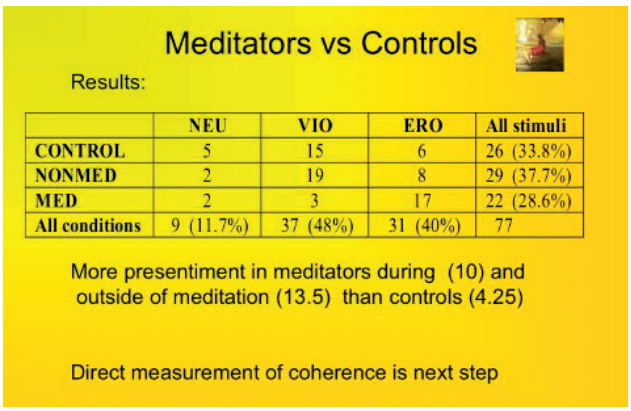

Figure 11. Results of the fMRI – meditator experiment

In both groups, meditators and matched controls, we found evidence for presentiment effects. I.e. there were more subjects with an anticipatory peak preceding the emotional pictures than preceding the neutral picture. However the effect was much stronger for the subjects that had a long meditation experience. There was an interesting internal effect with regard to the type of emotional picture and the type of actual brain state. If we asked the meditators to actually meditate in the scanner they had more 'presentiment' for the erotic stimuli. While, if they were in a resting state in the scanner, the 'presentiment' effect was strongest before the violent pictures. We should mention that the meditators had a long training

to be able to meditate in the scanner and all did indeed two session, one while meditating, one in resting state (in counterbalanced order)

We did ASSUME here that meditation results in more coherent brain states.

The next step would be to measure that coherence directly rather than to assume something about it.

There are more ways to test the model that I have discussed here. For instance the 'form' of the anticipation should in some way correlate with the form of the response. This might be amplitude or other more complex aspects.

Conclusion

What we have tried to demonstrate in this presentation is that the integration the study of anomalous phenomena with main stream research questions and theories results in useful research program, as well in empirical terms as in theoretical.

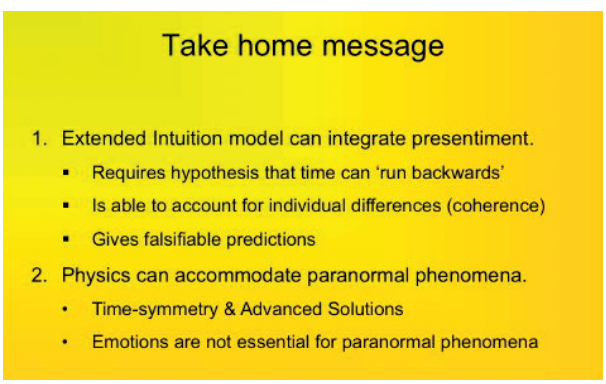

Figure 12. Review of conclusions

The domain of intuition research is obviously a very suitable domain to try this research strategy. However other domains are possible. For instance 'placebo research'.

The current approach might seem disappointing for those that feel that anomalous effects show that there are things that are not accessible for the scientific method. Time-symmetry indeed is extremely difficult

to grasp conceptually. It is even unclear if time-symmetry really violates causality. It is felt that by further mathematical formalization, the meaning of these phenomena might eventually become obvious.

THE INTUITIVE MANAGER: UNDERSTANDING AND APPLYING GUT FEEL IN BUSINESS DECISIONS

Eugene Sadler-Smith [*]

Many leaders and managers often claim that their 'hunches', 'gut feelings' or 'business instincts' are indispensable when making effective business decisions; for example, Sir Richard Branson in his autobiography claimed that he intuitively makes up his mind about "a business proposal within thirty seconds and whether it excites" him or not. Whilst the anecdotes of successful executives, such as Branson, Gates, Jobs and the former CEO of GE Jack Welch author of *Managing straight from the Gut*, and others are undeniably compelling, such claims cannot be accepted on face value alone. Scientific evidence is also needed. So, does the idea of 'managing from the gut' stand up to scrutiny? Can intuition itself be defined? Can it be explained? Is intuition useful in managing and leading modern business organizations, and can it be developed?

Can intuition be defined?

Intuition has been defined in a variety of ways, for example: 'knowing without knowing how or why you know', 'knowing or sensing without the use of rational processes', etc. Whilst such definitions are succinct and immediately appealing, they are of limited scientific or practical value to researchers or managers. A much more informative and theoretically compelling definition is required if we are to understand and use intuition more effectively. Recent years have witnessed a significant increase in interest in intuition and in intuition research both in management and psychology and neuroscience, as well as generally (e.g. Malcolm Gladwell's best-selling book *Blink!*). Fortunately it is now possible to at least define what was until recently an elusive concept with a degree of consensus. Intuitions are "affectively-charged judgements that arise through rap-

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id, non-conscious and holistic associations" (Dane and Pratt, 2007: 40). This definition, which many management researchers have embraced as a useful one, encompasses six essential characteristics of intuition, namely that it is:

1. A judgement: intuitions should be treated as hypotheses rather than as a guarantee of an wished-for or desirable outcome;

2. Affect-laden: intuition is often referred to as a 'gut feel' or a 'hunch'. Gut feelings can be positive signalling attraction towards a course of action, or they can be negative, signalling avoidance, and they can be strong or weak;

3. Holistic in two respects: (a) intuition is unique in that thought and feeling (cognition and affect) come together, in this sense it is an holistic mind-body process; (b) intuition comes about as a response to multiple and simultaneously-presented cues and stimuli in the environment (Hogarth, 2001). Intuition allows an experienced practitioner, e.g. a senior manager, to 'parallel process' such information quickly and efficiently through the perception and recognition of patterns that are held in long-term memory but are not readily available to conscious awareness and introspection, they may be tacit (and acquired implicitly) and in this sense, in the words of the philosopher Michael Polanyi, we may often 'know more than we can tell';

4. Non-conscious to the extent that only the outcome of intuition (the feeling) is 'posted' into conscious awareness (see Evans, 2003). The processes that lead up to gut feel aren't immediately available to introspection (indeed controversial claims have been made recently about the power of unconscious thought, and the idea of the unconscious mind has a long history in psychology, e.g. in the works of James, Freud, Jung, and other seminal figures);

5. Rapid, involuntary and ubiquitous: intuitions, which are ubiquitous across many different languages and national cultures, arrive into conscious awareness unbidden and instantaneously (Sadler-Smith, 2008);

6. Potentially powerful if informed by expertise and feedback and used under the right conditions (Kahneman and Klein, 2009), but also potentially perilous if used in complex judgemental situations in the absence of the necessary expertise (Myers, 2002).

Can intuition be explained?

The human brain may be thought of as a powerful 'dual processor' which can process information analytically and intuitively. Having, in a sense 'two minds in one brain' enables us to think, problem-solve and make decisions using our analytical mind, our intuitive mind or both, i.e. intuition and analysis are separate facets of a dual-process system of thinking (sometimes referred to as System 1 and System 2 respectively). These two systems differ in a number of fundamental ways (see Epstein, 2008), see Table 1.

'Analytical Mind'	'Intuitive Mind'
'Serial processing' mode	'Parallel processing' mode
Affect-free (unaffected by feelings)	Affect-laden (feelings integral to its operation)
Operates relatively slowly	Operates relatively quickly
Fast to learn (can learn new explicit knowledge quickly)	Slow to learn (builds expertise over many years)
Detail-focused	Holistic and big-picture oriented
Intentional	Involuntary
Demands 'mental energy'	Demands little 'mental energy'
Analytical processes are open to conscious awareness	Intuitive processes are unavailable to conscious awareness; only the outcomes of intuiting are posted into conscious awareness

Table 1. The 'two minds' model of analysis and intuition (adapted from Epstein, 2008; Evans, 2003)

The operations and outputs of the intuitive and the analytical minds

are 'contextually appropriate', i.e. neither is intrinsically better than the other (they are value-free), and each is suited to (i.e. evolved to deal with) specific sets of circumstances (see below). The dual process model is not equivalent to the 1970s notion of the 'split brain' as taken-up by management researchers at the time with intuition and creativity being housed in the right hemisphere and analysis and rationality in the left. Modern neuroscience paints a much more complex picture of the 'neural geography' of human thinking (see Lieberman, 2007), and we are currently witnessing the emergence of a neuroscience of intuition (see Segalowitz, 2007).

Intuitive judgements have been described as 'analyses frozen into habit' and the capacity for 'rapid response through recognition' (Simon, 1987), i.e. they are based on situations that have been met many times before, which have become internalised, compressed, and 'automated' (see Klein, 1998; Salas et al., 2010). Experienced managers often report knowing what to do in complex, fast-moving situations but being unable, at the time, to de-compress their judgement into a rational explanation. They know but they don't know how or why they know, and sometimes it may even feel to them like 'extra-sensory perception' (ESP) (see Klein, 1998).

Experts in any field ranging from management to musical performance have an extensive database of knowledge and skill held in long-term memory; the 'chunking' of this information into patterns of meaningful units aids recognition, recall and processing (Simon, 1987). These patterns make up mental representations or 'mental models' of the world built-up through formal and informal learning, exposure to challenging real-word problems and feedback (Klein, 2003). Novices tend to deploys rules and procedures in an un-nuanced way without taking the subtleties of the context into account (novices, including junior managers, tend to be much more analytic than intuitive, but they are analytical in a rule-bound, routine, and unsophisticated way). Intuitive experts on the other hand have acquired the skill to be able to perceive and discriminate between a large number of cues and contextual variables and arrive very quickly at a viable course of action (without considering a range of possible strategies, and in business often there simply is not the time or resources to be able to do this). Managers who possess this acquired intuitive expertise exhibit a fluidity of performance which is as easy to execute as it is difficult to articulate (see Dreyfus and Dreyfus, 1986).

'Informed intuition' is borne out of many years, consisting of thousands of hours, of learning and experience. Estimates vary, but expertise researchers often use the 'rule-of-thumb' of ten years or 10,000 hours of practising in a particular domain before expert levels of performance can be attained (see Ericsson and Charness, 1994). Expertise researchers also make an important distinction between merely 'learning-by-doing' and the type of training required to become a genuine expert (Hogarth, 2001). According to this view experts are less 'born' than they are 'made' through deliberate, focused and sustained efforts, both inside and outside their comfort zones (although this is a hotly-contested debate). As well as routinely practising what can already be accomplished, experts also engage in things that they cannot currently do well in order to extend their levels of performance (Ericsson, Prietula, and Cokely, 2007).

Is intuition useful IN business management?

A number of researchers have examined questions such as 'when and how do managers use intuition?', and 'what are the circumstances under which intuition is effective?' For example, Parikh and colleagues (1994) surveyed 1300 senior managers from nine different countries with the aim of understanding how relevant an international sample of managers felt intuition to be across different functional areas of management. Intuition was judged to be most relevant (in descending order) in: corporate strategy and planning (80 per cent); human resources (79 per cent); marketing (77 per cent); research and development (72 per cent); public relations (64 per cent); investment and diversification (60 per cent); and acquisitions, mergers and alliances (55 per cent). Intuition was judged to be least relevant in: operations and production management (28 per cent); finance (31 per cent); choosing technology and plant (35 per cent).

Burke and Miller (1999) interviewed 60 experienced professionals holding significant positions in major US organisations with the aim of investigating the use of intuition in decision making. They discovered that intuition is most often used in personnel or people-related decisions, when decisions need to be made quickly or unexpectedly, when uncertainty pervades in novel situations, in situations lacking specific cues, and also in combination with analysis. The main perceived beneficial outcomes of

intuition in Burke and Miller's study were that it expedites decision making (for example, by avoiding 'analysis paralysis' and leading to quicker decisions), improves decision making (for example, by providing a check-and-balance), and facilitates personal development (for example, by developing a full decision making and problem solving 'tool set'). Burke and Miller (1999) concluded that integrating intuitive approaches into business decision making processes may represent an important source of competitive advantage in dynamic, complex and turbulent business environments (see also Isenberg, 1984).

Researchers such as Burke and Miller, and Parikh were interested in straightforward descriptive surveys of managers' attitudes towards and perceptions of intuition. Other researchers in recent years have delved more deeply and been more concerned with questions of whether or not there is any hard evidence to support the view that intuition is a viable approach to take in management decisions, and is it useful under all, or only certain sets of conditions. A study of management decision making in non-profit organisations in the USA found that executive intuition was a significant and positive predictor of fiscal performance (Ritchie et al., 2007). A study of companies in the banking, computer and utility industries in the north-east USA found that intuitive processes are often used in organisational decision making and that they are positively associated with organisational performance in unstable environments but negatively related to performance in stable environments (Khatri and Ng, 2000). This latter finding adds further weight to the idea that intuition is not appropriate across all task but rather is contextually appropriate, and most appropriate in decisions that have to be taken under time pressure (for example to give 'first mover' advantage), where goals are not well-defined, and under dynamic and unstable conditions. Finally, intuition is a key capability attributed to many successful entrepreneurs, giving them the 'knack' of being able to identify business opportunities and assess their viability (Kickul et al, 2009) But in the field of management we need to be cautious and never loose sight of the facts that: (1) successful intuitions ('hits') tend to be highly visible and widely reported, whilst unsuccessful intuitions ('misses') tend to get under-reported if not 'buried'; (2) intuition is at its most powerful when it is used in combination with rational analysis (Hodgkinson and Clarke, 2007).

Can intuition be developed?

Arie de Geus, the former head of planning at Royal Dutch/Shell, once observed that one of the most surprising things in management and management development is that we tend to experiment with reality (de Geus, 1997). One result of this can be that fear of failure and its consequences becomes the dominant emotion; not only that, there are potential costs associated with capricious 'experimentation' in live settings. Contrast this potentially dangerous form of 'play' with that of the golfer on the practice green or the tennis player on the practice court: they get as many chances as they want or need to perfect their swing or stroke, and it does not matter on the practice grounds if they get it wrong. In management, by experimenting with reality, the learner gets very few chances to get it right without incurring major costs. From the perspective of the expertise-based view of intuition management and leadership developers might learn from sports' practice grounds and the musical conservatories: safe environments are needed for managers to improve the skills they already have, to acquire new and relevant skills, and analyse their performance and the reasons for success and failure. It is important for leaders and managers for them to be able to practice without fear that making mistakes may end-up costing them, their employees, their customers or their businesses. In management and leadership the practising of intuitive judgement in learning environments where there is focused deliberate practice outside of one's comfort zone in simulated and real settings with on-going precise, relevant and candid feedback is likely to lead to better intuitions and intuitive expertise (Hogarth, 2001).

Management development, like management itself, tends to be dominated by a rational, analytical paradigm. This is not necessarily a bad thing, but one unfortunate consequence of it is that intuition tends to be ignored, overlooked or kept firmly in the closet. As a result managers, even thought they inevitably experience intuition, often feel uncomfortable in admitting to its existence or in embracing it when it occurs (Hensman and Sadler-Smith, in press). The first step in developing better intuitive judgement is to understand the science of intuition: from a management education and training perspective the 'two minds' model is a useful theory for this purpose and has been successfully used as a

building block for incorporating intuition into MBA programs (Sadler-Smith and Shefy, 2007). This basic framework gives managers the necessary factual knowledge and understanding of dual-processing, however an additional and vital experiential step is also required – i.e. developing intuitive self-awareness using practical techniques, for example:

(1) Acceptance of intuition: recording intuitions in a journal, diary or log book is a powerful way for documenting and exploring the strength, clarity and form of ones' intuitions, and ultimately for coming to accept the richness of ones' own personal intuitive experiences. Specific guidelines for journaling intuitions have been developed by Bill Taggart (see the 'Intuitive Self' project web site at http://www.the-intuitive-self.org) and the use of intuition journals has been evaluated and shown to be effective in a management education context (Sadler-Smith and Shefy, 2007)

(2)Creating the conditions for intuition to be 'heard': a number of management development researchers and practitioners have focused their efforts upon ways of 'quieting' the analytical mind (Sadler-Smith and Shefy, 2007). The assumption behind this is that the voice of the intuitive mind (including subtle bodily sensations) may be drowned-out by the incessant activity and constant 'verbalisations' of the analytical mind (see Epstein, 2008), and therefore requires a subtle tuning-in.. There are a variety of approaches to 'giving the rational mind a reprieve' (Burke and Sadler-Smith, 2006) and tuning-in to intuition which range from simple physical and mental relaxation and 'switching-off' to explicit meditative and contemplative techniques rooted in Eastern philosophies such as Buddhism. Techniques such as these are becoming increasingly common and more acceptable in the West;

(3)Balancing intuition and analysis: a fundamental precept of the 'two minds' model is that the 'intuitive mind' and the 'analytical mind' each have an important role to perform in human reasoning, judgement and decision making. Consequently it is important that managers are aware of the strengths and the limitations of each, and are able to use them as a balance and check on each other (Sadler-Smith and Shefy, 2004).

Conclusion

The suggestions offered in this article are tentative steps towards building a repertoire of techniques for the integration of intuition into the management and leadership of business organizations. One aim might be to build an 'intuitive intelligence' the essence of which is the balancing of intuition and analysis in such a way that managers and leaders have the cognitive versatility to deal with a wide range of tasks, problems and decisions so that they can 'switch mental gears' to fit the situation they find themselves in (see Hodgkinson and Clarke, 2007). As intuition becomes increasingly accepted in business it is to be hoped that the management and leadership development profession will move in this direction also, and not only build a range of innovative and creative approaches for the development of intuitive intelligence, but also evaluate rigorously the impact upon leadership, judgement and decision making in organisations (Sadler-Smith, 2010). Intuition research in management is in its infancy, but the study of intuition and its underlying psychological and neural processes, as well as its links to other psychological and psychophysiological phenomena, presents an important window into behind and beyond the brain.

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INTUITION IN CLINICAL DECISION-MAKING

Cilia Witteman *

Abstract

Medical and mental health professionals are expected to carefully consider the symptoms of their patients, to come up with different alternative explanations and diagnoses for these symptoms, and to draw up a reasoned - preferably evidence-based - treatment plan.

In The Netherlands they are taught to perform this decision making process by following the Diagnostic Cycle (De Bruyn, Ruijssenaars, Pamijer, & Van Aarle, 2003), shown in Figure 1.

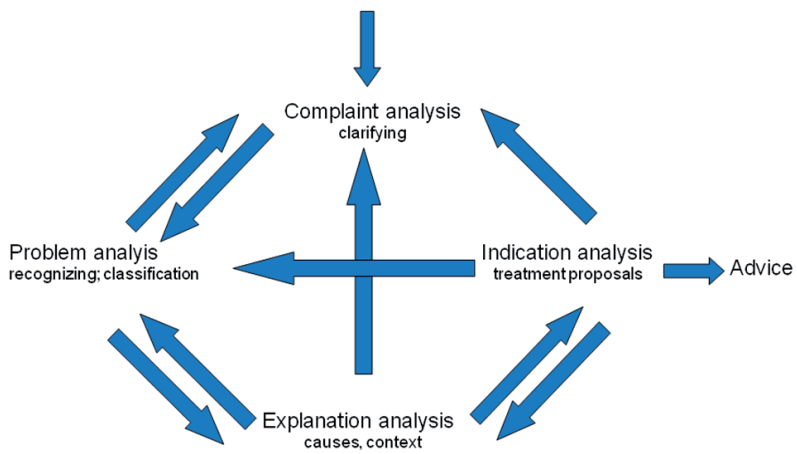

Figure 1. The Diagnostic cycle

This cycle is based on hypothesis-testing methods of empirical research: In each analytic phase, hypotheses – respectively about the presenting complaints, the resulting problems, the explanations for these problems and the indication for treatment – are generated and tested. Clinicians may have intuitions, but they are expected not to rely on them. Clinical intuition is distrusted as not being scientific but subjective, and

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not evidence-based but experience-based. Yet clinicians will unavoidably also use their professional intuitions, in addition to or even as replacements of the prescribed careful considerations. For practising clinicians there is a tension between analytic theory and experience-based practice, and clinicians do not always work analytically – they have developed routines and preferences, they skip diagnostic phases because of time pressure, they rely on their professional expertise.

Indeed, the very influential Presidential Task Force on Evidence-Based Practice of the American Psychological Association (2006) states that clinical expertise, next to research and patient characteristics, is relevant to good treatment outcomes. According to his task force, clinical expertise is acquired through extensive theoretical and practical training. It includes competent judgment and decision making, and also interpersonal expertise and self-monitoring. Others specify that clinical expertise results from compiling book-derived knowledge with experience-based knowledge into patterns of symptoms, illness scripts or patient prototypes (e.g. Elstein & Schwarz, 2002).

In this contribution I equate clinical expertise with professional clinical intuition and expert intuition in clinical decision making. Most scientific definitions agree that intuition is based on automatic processes which rely on knowledge structures that are acquired by different kinds of learning. Intuition operates at least partially without peoples' awareness and results in feelings, signals, or interpretations. Apart from consensus about these aspects of the definition, the term 'intuition' is used as a label for different kinds of automatic processes. We have categorized these processes into four general types (Glöckner & Witteman, 2010a), presented in Figure 2.

Associative Intuition: direct retrieval of learned associations
(slow walk – depression)

Matching Intuition: direct response based on retrieval of learned matching exemplar/prototype
(restlessness of child matches prototypical ADHD)

Accumulative Intuition: direct reaction based on automatic accumulation of pieces of evidence
(quick scan for indications of Compulsive Disorder)

Constructive Intuition: direct conclusion based on unconsciously constructed mental representation
(fought in Afghanistan, nightmares, PTSD)

Figure 2. The four categories of intuitive processes, with illustrative examples

Professional expert intuition is a fast and cognitively impenetrable process that is based on extensive experience, and that, when feedback during its acquisition has been adequate, may lead to accurate and high confidence responses. It contains the four types of intuitive processes, in different phases of the clinical decision making process, in isolation or in combination; furthermore, it is based on significant, often dedicated, explicit learning (Klein, 2003; Sadler-Smith, 2008). As a result, expert intuition is domain-specific. It allows experts to assess situations quickly and correctly, spotting anomalies and recognizing the viable options. Intuitive experts are not easily able to justify their decisions when they are made without awareness, which may explain why they are sometimes mistrusted. However, and again similar to other types of intuition, if learning has taken place in representative situations and with adequate feedback, the decisions from expert intuition will be correct as well as efficiently fast.

Development of expert intuition

Clinical expertise develops from both clinical and scientific training, it arises from theoretical understanding and experience, is the result of self-reflection and of continuing professional education and training (APA Task Force, 2006). With increasing levels of practical experience, the mental representations that are used to come to clinical decisions change, from rules based on textbook knowledge to patterns and prototypes to routines. The decision processes also change in parallel, from deliberate and rule-based through pattern matching to intuitive (cf. e.g. Dreyfus & Dreyfus, 1986).

Since intuitions develop from learning, the learning environment is crucial in developing correct intuitions. Intuitions may be false when they are not based on proper learning or on learning without adequate feedback, or when the intuitive clinician is not an expert, that is: does not reflect on their own intuitively reached decisions but shows 'premature closure'. When learning has taken place in a 'friendly' environment, intuitions will be adaptive, correct and efficient (Hogarth, 2001). Of course decisions reached analytically may also be erroneous. A whole library of studies attests to the pitfalls and systematically occurring errors in ana-

lytic judgment and decision making (starting with Tversky and Kahneman in 1974).

We have found an indication of changing decision making patterns, or at least of decision making performance, in a study in which we compared novice clinicians, clinicians with between two and ten years of experience and very experienced clinicians (Witteman & Van den Bercken, 2007). The results are shown in Figure 3.

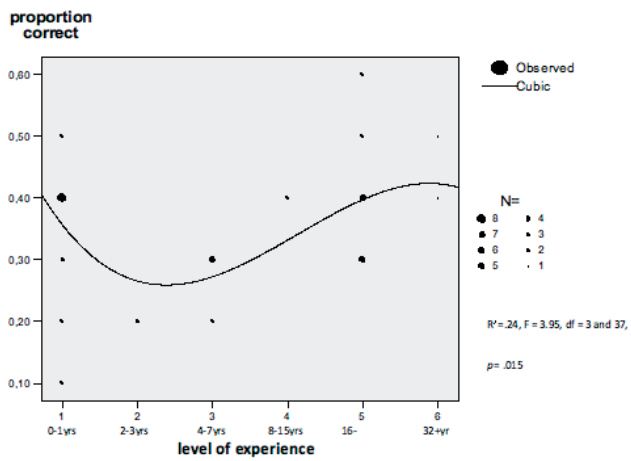

Figure 3. Correct performance on diagnostic classification by years of experience

We hypothesize, although we cannot be sure since we did not use an appropriate method to find out (cf. below), that the novices performed relatively well since their textbook knowledge was fresh in their minds, that the very experienced had lots of compiled knowledge, and that the intermediates were not proficient in the rules anymore and did not have enough experience to rely on their routines yet. The fact that the level of performance did not exceed 40 % must have been due to the difficulty of our stimulus material.

Methods to study intuition

One general method to find out whether intuition or deliberation is used in a clinical decision task, is to set a concurrent cognitive task – for

example counting back in threes from 1000. If decisions are made intuitively, this concurrent task should not disrupt performance; if analysis is used, concurrently having to perform another task impairs performance.

Our recent book (Witteman & Glöckner, 2010b) contains chapters by different authors who outline different methods that can be used to further study intuition. I give some examples.

Think-aloud

In this method the clinician is presented with a representative case, and asked to verbalise everything they are thinking while deciding upon a diagnosis and treatment. The format and contents of their reasoning are derived from an analysis of the protocols of these think-aloud sessions. Based on these data, first hypotheses can be derived (and later tested) about which kind of intuitive processes play a major role: Do clinicians just react in a stimulus-response manner (associative intuition)?; do they accumulate evidence and automatically add it up (accumulative intuition)?; do they mainly match the evidence to previous cases (matching intuition)?; or do they construct consistent interpretations of the case (constructive intuition)? From an early think-aloud study (Witteman & Kunst, 1997) which was at that time not undertaken to investigate intuition, we can see that this method has potential. One participant for example said "Depression, yes; so cognitive-behaviour therapy" a typical instance of associative intuition. Another participant said "I can understand that with such a dominant father, and then a demanding job, he feels inadequate and gets depressed." This could refer to constructive intuition. Since intuition is primarily implicit, an explicit method such as think-aloud will not give more than hypotheses about intuitive processes.

Eye-Tracking

Eye-tracking methods are useful for the study of intuitive processes but technically rather demanding. They may be used with the information that is relevant for a decision presented in a graph or a matrix. Participants' attention to different pieces of information is tracked by a head-mounted instrument. Measures such as shifts in attention, single fixation durations and the number of repeated information inspections can be used to test hypotheses about processes. If, for instance, participants only

look at the core facts of a case and instantly feel that the patient does (not) have a disorder, they may rely on associative intuition. If participants quickly scan the whole matric with short fixations on each piece of information, they may rely on accumulative or constructive intuition. Long fixations and repeated information inspections may, in contrast, indicate the (additional) use of deliberate strategies.

Physiological Measures

Intuitive processes are often accompanied by physiological arousal, such as increased heart rate or sweating. This is taken to reflect an affective reaction. It is often assumed that deliberation is accompanied by low or no arousal (i.e., no affective reaction). The assumptions, which could and should be tested empirically, are that with associative intuition arousal is dependent on previous learning, while with accumulative intuition the overall affective evaluation of an option is dependent on the aggregate of the facts speaking for and against it. With constructivist intuition arousal would be induced by inconsistency of information and increase with increasing conflict between pieces of information (everything else being equal).

Conclusion

I believe that qualitative analyses are not adequate to answer empirical questions about the use and merits of clinical intuition, although they are useful to inform these questions (cf. Srivastava & Grube, 2009). I would propose that researchers use as many different methods as possible at the same time for the same decision tasks, to test predictions about specified types of intuition. I have outlined some applicable methods (and see Glöckner & Witteman, 2010b). For example, think-aloud may be used to get the basic relevant information about clinical cases, which can then be presented in a matrix. Both eye-tracking and physiological measures can then be applied while participants make clinical decisions. I hope that this line of research, which to date is quite underdeveloped, will soon yield answers to the open questions about the use of intuition in clinical decision making.

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RESEARCHING AND LEARNING MATHEMATICS WITH A BIG HELP FROM INTUITION

Nuno Crato [*]

1. What is mathematical intuition?

There are many approaches to discuss mathematical intuition. One can raise philosophical questions. One can ask, for instance, whether we appropriate mathematical truths through intuition. This is a deep question, as it goes to the heart of mathematical truth. Similarly, one could ask from where does mathematical intuition come. Is it originated in real world experiences (intuitionism)? Is it simply a reflex of the social environment and social conventions (postmodernism)? Or intuition is simply a misleading and primitive tool to be avoided, as mathematics is just a formal and arbitrary construction (formalism)?

For the mathematician and for the math teacher, the main questions are different:

- Does intuition help or harm research and teaching?
- How do we balance intuition and rigor?

I am going to start raising seven mathematical questions and ask you to think about what role can intuition play in answering them.

1. On a plane, how many different straight lines pass through two different points?

2. If x and y represent numbers and if $x + y = 10$, how much is $2x + 2y$?

3. In how many connected parts does a simple closed non-intersecting curve divide a plane?

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4. If a balanced coin has been flipped 4 times and we always have got heads, how likely is it that we also get heads on the 5th flip?

5. Flipping 5 times a coin, what is more likely, that we get 5 heads in a row or 4 heads and then 1 tail?

6. I have two kids; the oldest one is called John, what is the probability I have one kid of each gender?

7. Mary has two kids and I know at least one of them is a boy; what is the probability she has one kid of each gender?

No one should have difficulty in answering the first question. Actually, people are sometimes surprised to see it as a question. It is evidence in our world and in the geometry we learn in school. But try to prove it!

In contrast, the answer to the second question is immediate for the mathematical trained person. Of course, the second quantity is twice the first, so the answer is 20. However, people who have had trouble with algebra may start trying to solve the first equation and then hesitate, as they realize there is no unique solution. Lack of intuition is identified here with lack of mathematical raining.

The third question is a tricky one. Of course, the curve divides the plane into two parts. No one doubts it. However, a solid mathematical proof for this fact is very difficult and mathematicians spent many years trying to find it. It's a famous result now called Jordan's Curve Theorem, as a tribute to the mathematician Camille Jordan who first proved it in 1887.

The fourth and fifth questions illustrate one of the easiest concepts in probability (the one of independent experiments) and one of the most common intuition mistakes. It is an example of what the philosopher

Hempel called "misguided intuition" (see, e.g., Martin Gardener, "Probability paradoxes", in *Hexaflexagons and Other Mathematical Diversions*, Chicago: The University of Chicago Press, 1959, p. 53). Most people confuse the event of getting five heads in a row, which actually has a very small probability (0.03125) with the event of getting an extra head, which is very likely (0.5). The trained mathematician or even the trained student has no problem with this question, as they immediately recognize the difference between the two cases.

The sixth and seventh questions are even more counterintuitive. The answer to the sixth is 1/2, while the answer to the seventh is 2/3. Failing to recognize that we have two out of three possibilities on the second case is very common. Most people, even mathematicians, think twice when dealing with these two questions. They are not difficult, but we have to be clear about what is the situation under discussion.

As I believe these examples show, intuition can be helpful and misleading, and intuition power depends on previous experiences and technical training.

2. Genius intuition

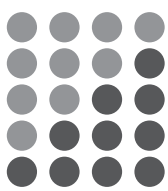
One of the most interesting stories about child prodigy intuition is the one of the young Gauss. We are talking, of course, of Carl Friedrich Gauss (1777-1855), the only mathematician in history to have received the name of *Princeps mathematicorum*. He is certainly one of the half-dozen greatest mathematicians of all time.

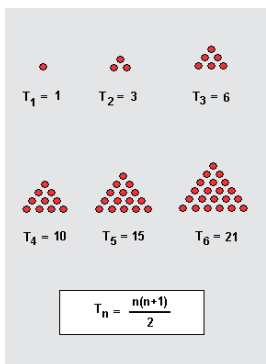
When he was at elementary school, we are told, his teacher, J.G. Büttner, gave him a task: add the numbers from 1 to 100. The young Gauss reputedly produced the correct answer within seconds, to the astonishment of his teacher. The details of the story are at best uncertain, but many historians believe Gauss's realized that pairwise addition of terms from opposite ends of the list yield identical intermediate sums: 1+100=101, 2+99=101, 3+98=101, and so on. Then, he computed the total sum as 50×101=5050.

I reproduce here alternative suggestions given by Brian Hayes [1]. They all give the correct result and lead to equivalent formulas, namely:

$S = (n + 1) \times n/2 = 5050$
which in this case just leads to the computed solution
$S = 101 \times 100/2 = 5050$,
This is just an application of the well-known formula for sums of arithmetic progressions:
$S = (a_1 + a_n) \times n/2$.

Gauss could also have thought about triangular numbers, which have well-known sums. He could have done this visually and retrieved the triangle number's sum formula from the completed rectangle, which doubles the triangular numbers and provides directly the first of the computation formulas above.





The point is that there were many paths for Gauss's intuition and for a normal person they were all easy to follow if there was a previous training with any of these ways of thinking.

3. Intuition and mathematical discovery

Two well-known mathematicians have written about the role of intuition in the process of mathematical discovery. They are Henry Poincaré

[1] Brian Hayes, "Gauss's day of reckoning", American Scientist, May-June 2006.

(1854-1912) and Jacques Hadamard (1865-1963), both French, both very influential scientists. Still today, their works are the standard reference for this topic. Poincaré wrote *Science et méthode* (1908), in which he included two often-quoted essays, "L'invention mathématique" and "Les définitions mathématiques et l'Enseignement". He also wrote *La Valeur de la science* (1905) in which he included another fundamental essay, "L'Intuition et la logique en mathématiques". His main thesis is that mathematicians start working in a non-structured way that provides them with a random combinations of possible solutions. At a later stage, there is a rational and rigorous "critical evaluation".

Poincaré was also a great writer, with a great domain of sentences and a gift for punch lines. It's worthwhile to reproduce some of his most famous statements (all underlines are mine).

> "It is impossible to study the works of the great mathematicians, or even the lesser, without noticing and distinguishing **two opposite tendencies**, or rather, two entirely different kinds of minds. The one sort are above all preoccupied with **logic**; reading their works one believes they have only advanced step by step… The other sort are guided by **intuition** and at the first stroke make quick but somewhat precarious conquests…
> … logic and intuition have each other their necessary role. Both are vital. Logic, which only can give us certainty, is the **instrument of proof**: intuition is the **instrument of discovery**."
> (Poincaré, *La Valeur de la science*, I)

> "It is certain that the combinations which present themselves to the mind in a kind of sudden illumination after a somewhat prolonged period of unconscious work are generally useful and fruitful combinations…
> …all the combinations are formed as a result of the automatic action of the subliminal ego, but those only which are interesting find their way into the field of consciousness…
> A few only are harmonious, and consequently at once useful and beautiful, and they will be capable of affecting the geometrician's special sensibility I have been speaking of;

> …which, once aroused, will direct our attention upon them, and will thus give them the opportunity of becoming conscious… In the subliminal ego, on the contrary, there reigns what I would call liberty, if one could give this name to the mere absence of discipline and to disorder born of chance."
> (Poincaré, *Science et méthode*, I-III)

Building upon the ideas of Poincaré, Hadamard wrote a full book, *Essai sur la psychologie de l'invention dans le domaine* mathématique (1954). In this book, which is still in print today, he distinguished four stages in mathematical creation:

Preparation → Incubation → Illumination → Verification

4. Heuristic (*ars inveniendi*)

The Hungarian-born mathematician George Polya (1887–1985) developed these ideas into a scheme he tried to adapt to mathematical teaching. He described what he called "heuristic reasoning", which is reasoning not regarded as final and strict, but as provisional and plausible only. It's worthwhile to listen directly to him.

George Polya
(1887-1985)

"We are often obliged to use heuristic reasoning… before obtaining certainty we must often be satisfied with a more or less plausible guess."
"Heuristic reasoning is often based on induction, or on analogy."
"Heuristic reasoning is good in itself. What is bad is to mix up heuristic reasoning with rigorous proof. What is worse is to sell heuristic reasoning for rigorous proof."
(G. Polya, *How to Solve It*, 1945)

These famous Polya sayings have won unanimous acclaim from mathematicians, from educators and, to the best of my knowledge, from cognitive psychologists. George Polya extended his reflections over the process of reasoning in order to solve mathematics problems and formulated a few well-known and useful principles. Among his advices there is a

famous one: "If you can't solve a problem, then there is an easier problem you can solve: find it."

Following Polya's ideas, some educators have discussed the possibility of autonomously teaching problem-solving strategies as a powerful aid to mathematics education. However, this possibility conflicts with results that cognitive psychologist have attained from the second part of the twentieth century up to this moment. As it has been put recently, "the research suggests that we can teach aspiring mathematicians to be effective problem solvers only by providing them with a large store of domain-specific schemas. Mathematical problem-solving skill is acquired through a large number of specific mathematical problem-solving strategies relevant to particular problems. There are no separate, general problem solving strategies that can be learned." (John Sweller, Richard Clark, and Paul Kirschner, "Teaching General Problem-Solving Skills Is Not a Substitute for, or a Viable Addition to, Teaching Mathematics", *Notices of the AMS* 57–10, 1303–4, November 2010)

5. The source of mathematical intuition

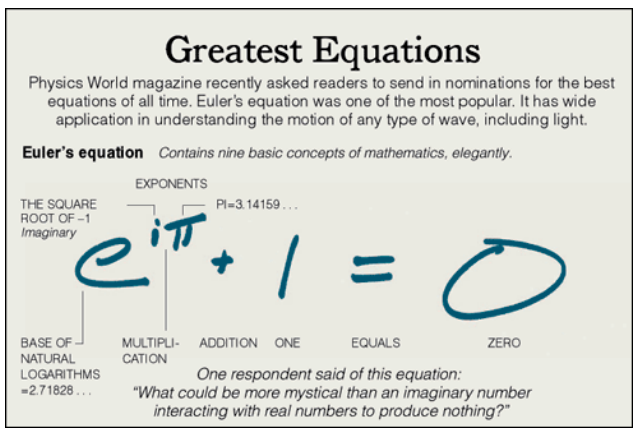
As quoted above and according to recent cognitive psychology research, mathematical intuition can be obtained through training on "a large number of specific mathematical problem-solving strategies relevant to particular problems". This means that we can encourage students to guess, try to develop on them some training on exploring guessed solutions, but nothing will work unless students haven't gain training in a great number of mathematical problems.

Once this training and knowledge is acquired, it seems that a big help for mathematical intuition is the perceived beauty of solutions that come to mind. Beauty in science is mostly an acquired taste, but most scientists agree that it can provide a stimulus for research.

No one has expressed himself more passionate about the role of beauty in science as the British physicist Paul Dirac, who in 1963, commenting on a specific mathematical physics theory, wrote in *Scientific American*: "This result is too beautiful to be false". He went on saying that "it is more important to have beauty in one's equation than to have them fit experiment". And added: "It seems that if one is working from the point

of view of getting beauty in one's equations, and if one has really a sound insight, one is on a sure line of progress."

In 2004, the *Physics World* magazine has made a poll about beauty in mathematical formulas. The contest gave the victory to a famous Euler equation that encompasses both the most important mathematical numbers (zero, one, pi, the natural logarithms base, and the imaginary unity) and the most important operations (addition, multiplication, and exponentiation). Previously, in 1990, *Mathematics Intelligencer* magazine readers have selected the same result as the "most beautiful theorem in mathematics".



Some research has been done about this surprising aesthetic penchant of mathematicians and scientists. A recent paper by R. Reber, M. Brun, K. Mitterndorfer ("The use of heuristics in intuitive mathematical judgment", *Psychonomic Bulletin & Review* 15, 2008) has presented compelling evidence for these equivalences:

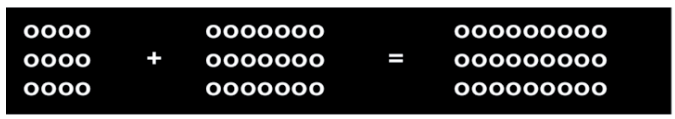
$$\text{Mathematical Beauty} \leftrightarrow \text{Symmetry} \leftrightarrow \text{Processing Fluency}$$

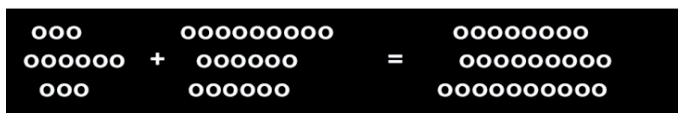
Following previous research, the authors identify beauty with symmetry, which allows for a more objective way of exploring the relation between beauty and intuition for mathematical truth.

It is well known that symmetry, in nature, signals health and so the

role of aesthetics appears natural for the choice for a suitable mate. From the point of view of evolutionary psychology, this is a natural reason for our attraction towards beauty, i.e., towards symmetry.

Reber and his co-authors report results of a test on various subjects showing how symmetry improves information processing. One of their experiments is shown below.





It is simple to see how symmetry improves processing fluency and how processing fluency can be identified with beauty and this can be taken as a clue for truth.

Beauty, intuition and mathematics go together.

6. Some conclusions that may be helpful for mathematics teaching and researching

It seems certain that it is very often useful to start with intuition for solving mathematical problems. This is true for researchers and students alike. However, one must always insist on rigorous verification of the paths and hints given by intuition. As Polya said, the worst mistake is to sell intuition as rigorous proof.

Intuition development cannot be opposed to rigorous knowledge. In fact, intuition depends on formal experience and practice, it's not a simple gift nor a capacity that should be developed against reasoning. It seems that mathematical intuition depends on processing fluency and better processing fluency depends on knowledge and practice. After all, knowledge and practice develop mathematical intuition.

THE POWERS AND PERILS OF INTUITION

David Myers [*]

"The heart has its reasons which reason does not know."
Pascal, *Pensées*, 1670

"He that trusteth in his own heart is a fool."
Proverbs 28:26

Who offers the better advice?

Was Pascal right that we should tune into our intuition and trust the force within? "Buried deep within each and every one of us, there is an instinctive, heart-felt awareness that provides - if we allow it to - the most reliable guide," offered Prince Charles. We need, he added, 1"to listen rather more to the common sense emanating from our hearts." Trust yourself. Rely on your gut instincts. Whether hiring, firing, or investing, silence distraction and tune into the whispers of your intuition.

Or was King Solomon's Proverb more often right in suggesting that we should be wary of the inclinations of our heart? Given our vulnerability to self-inflated overconfidence, should humility trump self-reliance? With bright people so often doing demonstrably dumb things, do we instead need more rationality, more checking of hunches against reality, more critical thinking? "The first principle," said physicist Richard Feynman, "is that you must not fool yourself - and you are the easiest person to fool."

This much is sure: Intuition - our effortless, immediate, unreasoned sense of truth - is huge. Intuitions shape our fears, our first impressions, and our relationships. Intuitions sway politicians ("I'm a gut player. I rely on my instincts," said President Bush in explaining to journalist Bob Woodward his decision to launch the Iraq war). Intuitions influence interviewers grilling interviewees. Intuitions guide our investments and sway our gambles.

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For those disposed to follow the inner whispers of their unseen mind, today's pop psychology offers books on "intuitive healing," "intuitive learning," "intuitive managing," "intuitive trading," and much more. Magazines encourage us to "let intuition be your guide" (by giving "yourself permission to listen to … your intuitive voice" and learning to exercise your "intuitive muscle"). If you wonder whether your partner may be cheating on you, you can learn to "trust your body. One way intuition speaks to us is through actual physical sensations."

Is our consciousness sometimes invaded by unbidden truth, which is there for us to behold if only we would cease analysis and listen to the still small voice within?

Intuition's Powers

"Intuitive thinking," noted Daniel Kahneman (Mellers, Hertwig, & Kahneman, 2001, describing Kahneman's views), "is perception-like, rapid, effortless." By contrast, "deliberate thinking is reasoning-like, critical, and analytic" (see Table 1). As I felt compelled to explain in *Intuition: Its Powers and Perils*, one of the biggest lessons of recent psychological science is the enormity of intuitive, nonconscious information processing. Thinking, memory, perceptions, and attitudes all operate on two levels. They function with "dual processing" - via a consciously controlled, analytical "high road" and an automatic, intuitive "low road." Our mind, it seems, has two component minds, each supported by its own neural equipment.

INTUITION System 1	REASONING System 2
Fast Parallel Automatic Effortless Associative Slow-learning Emotional	Slow Serial Controlled Effortul Rule-governed Flexible Neutral

Most judgments and actions are governed by System 1.
They are unproblematic, skilled, and adequately successuf.

Table 1. From Daniel Kahneman's Nobel Lecture

Perhaps more than Freud suspected (and in ways he didn't anticipate), our brains generate our feelings, judgments, and actions on the lower automatic road, below the radar of our awareness, off stage, out of sight. Studies of subliminal priming, implicit learning, implicit memories, implicit attitudes, speedy heuristics, spontaneous trait inference, right hemisphere processing, instant emotions, and creativity all illustrate the extent of nonconscious processing. This "fast and frugal" low road generally functions adaptively and efficiently. Consider some striking examples:

Automatic Processing

Consciousness, by its nature, is mindful of how its intentions and choices govern our lives. But consciousness overrates its own control. We have all experienced what John Bargh and Tanya Chartrand (1999) call the "automaticity of everyday living." Learning to bike or drive requires focused concentration. But soon we do it mindlessly, as if on automatic pilot. Our body knows how to balance while pedaling and turning. While our mind is elsewhere, or while we're conversing, our hands and feet will drive us home (sometimes even when we meant to stop by a store).

Speech, too, becomes automatic. We could easily coach a non-English speaker on how to form the words "dad" (with the tongue) and "pad" (with the lips). But how do we say "pad" versus "bad"? That's just automatic. Intuitively our mouths just know, much as we somehow effortlessly spill words out of our mouths with near-perfect syntax (pretty amazing, given how many more ways there are to mess up). We just know, without knowing how we know, that "a big red barn" sounds better than "a red big barn."

When perceiving our world, unconscious information processing occurs simultaneously on multiple tracks. When we look at a bird flying, we are consciously aware of the result of our cognitive processing ("It's an eagle!"), but not of our subprocessing of the eagle's color, form, movement, distance, and identity. Reflecting on this out-of-sight information processing, George Miller once described two ocean liner passengers gazing over the sea. "There sure is a lot of water in the ocean," said one. "Yes," replied the other, "and we've only seen the top of it."

Blindsight

Sometimes science is stranger than science fiction. A striking example of dual processing comes from cognitive neuroscientists Melvyn Goodale and David Milner (2004, 2006). A St. Andrews, Scotland, woman, whom they call D. F., was overcome by carbon monoxide. The resulting brain damage left her unable to recognize and discriminate objects visually. Yet, though perceptually blind, she was functionally only partly blind, for she would act as if she could see.

Asked to slip a postcard into a mail slot, she could do so, regardless of its angle. Although unable to report the width of a block in front of her, she could grasp it with just the right finger-thumb distance. In a compelling demonstration, blindsight pioneer Larry Weiskrantz invited another patient to put down his cane and walk down a hallway that was obstructed with unseen objects. The patient walked the hallway slalom course perfectly.

How could this be? Goodale and Milner knew that the eye sends information simultaneously to different brain areas, which have different tasks. A scan of D. F.'s brain activity revealed normal activity in the area involved with reaching for and grasping objects, but damage in the area involved with consciously recognizing objects.

How strangely intricate is this thing we call vision, conclude Goodale and Milner in their aptly titled book, *Sight Unseen*. We have two visual systems, they concluded - "one that gives us our conscious perceptions, and one that guides our actions." We may think of our vision as one system that controls our visually guided actions, but it is actually a dual-processing system. A visual perception track enables us unconsciously "to create the mental furniture that allows us to think about the world" - to recognize things and to plan future actions. A visual action track - "the zombie within" - guides our moment-to-moment behavior.

Reading Thin Slices

Often, after observing someone for a mere "blink," we feel a positive or negative response. As Nalini Ambady and Robert Rosenthal (1992, 1993) repeatedly demonstrated, thin slices of behavior can indeed be re-

vealing. Viewing three two-second clips of college professors' teaching allows raters to offer teaching evaluations that are reasonably congruent with their students' evaluations. To form a sense of someone's personality - their energy, confidence, and warmth - six seconds will often do.

Even micro-thin slices can be illuminating. When John Bargh flashed New York University students an image of a face or object for just 2/10ths of a second, they reacted appropriately. "We're finding that everything is evaluated as good or bad within a quarter second," he reported (1998). Prior to any rational analysis, we may find ourselves loathing or loving something or someone.

There is biological wisdom in the perception-emotion express link. If facing someone or something in the forest, our ancestors needed to respond instantly: Friend or foe? Those who could read an expression in a flash more often lived to leave descendents, including us.

Prejudice and moral judgments often arise from instant gut-level feelings that cause us to rationalize. The rationalist idea that we reason our way to moral judgments often has it backward, argues Jonathan Haidt (2008). Many people, he finds, feel instant disgust over an objectively harmless but degrading behavior, such as scrubbing a toilet with the flag, and will then mentally scramble to construct moral reasons that support their moral intuition. First come the intuitive feelings, then the rationalization. Prior to developing reasoning, even year-old infants display intuitive moral responses to other children's good and bad behaviors. "They respond on a gut level," reports Paul Bloom (2010). "They tend to smile and clap during good events and frown, shake their heads and look sad during the naughty events."

Our learned associations feed our automatic intuitions. If a stranger looks and sounds like people we have come to trust - the people around us - we likely will be implicitly accepting. If the person is unlike those familiar to us, or like someone who has previously threatened or harmed us, we may react warily. Pawel Lewicki (1985) explored this associative learning by having students interact with a woman who, in different experiments, either behaved warmly or coldly. Later, when rating two other women, students intuitively preferred someone who looked like the friendly woman, and they avoided the one who looked like the unfriendly woman.

Intuitive Expertise

With experience, even complex judgments can become automatic. Rather than wend their way through a decision tree, experienced physicians and car mechanics will often, after a quick listen and look, recognize the problem. After a glance at a chessboard, chess masters, who may have 50,000 board layouts in memory, intuitively know how to respond (thus enabling them simultaneously to play and defeat a roomful of less able challengers).

Each of these forms of intuitive expertise involves learned pattern recognition. When experienced gourmet cooks say they "just use experience and intuition" in mixing ingredients, they are stating "the theory of experiment performance that has emerged in recent years," noted Herbert Simon (1992). "In everyday speech, we use the word *intuition* to describe a problem-solving or question-answering performance that is speedy and for which the expert is unable to describe in detail the reasoning or other process that produced the answer. The situation has provided a cue; this cue has given the expert access to information stored in memory, and the information provides the answer. Intuition is nothing more and nothing less than recognition."

Intuition's Perils

So, are we smart to tune down our rationality and tune into our heart? As Pascal himself taught, no single truth is ever sufficient. Any truth, separated from its complementary truth, is a half-truth. It is true that automatic intuition drives much of our behavior, and in domains from routine perception to acquired expertise has powers upon which we adaptively rely. Yet, at our peril, we often underestimate intuition's errors.

Hundreds of experiments display our capacity for illusion, bias, and intuitive misjudgment and misprediction (even misprediction of our own future emotions and behaviors). People exhibit attribution errors, self-serving biases, belief perseverance, and false consensus presumptions. They overestimate their lie-detection accuracy, their interviewee assessments, their psychic powers, and their stock-picking acumen.

These and other commonplace errors often derive from adaptive

tendencies. Our perceptual processes, which normally serve us well, can produce stunning visual misperceptions. We intuitively (and usually correctly) presume that fuzzy, hazy objects are more distant than clear ones. But in fog, this can make the truck up ahead seem farther away than it is. Ditto with our other intuitive errors, which often are a by-product of mental shortcuts that simplify complex information. In many ways, simple thinking rules "make us smart" (Gigerenzer & Todd, 1999). Our seat-of-the-pants intuitions are like scientific theories - useful generalizations that sometimes err. Consider two examples of problematic intuition.

Implicit Prejudice

After reacting with apparent hostility to someone of another ethnic group (think Mel Gibson's drunken anti-Semitic tirade, or Tea Partiers' venom directed at Barack Obama), people may assure us that "I am not a racist." At the level of conscious, explicit attitudes, they may be right. Yet our implicit attitudes may simultaneously reveal an aversion to those who look, sound, or act differently from us. Thus, we may feel an intuitive, gut dislike of people for whom we express respect. And while our explicit, controlled attitudes may predict our deliberate, controlled actions, our persisting implicit attitudes may erupt into our spontaneous feelings. Prejudice is often more a knee-jerk intuitive response than a considered decision.

The potency of implicit attitudes is shown in some famous studies of implicit racial association. When primed with a flashed Black rather than White face or name, people may more quickly recognize a subsequently flashed object such as a gun, or mistake a wrench as a gun (Correll, Park, Judd, & Wittenbrink, 2002, 2007; Payne, 2006). Implicitly prejudiced people may also take longer to identify pleasant words (such as "peace" and "paradise") as "good" when associated with Black rather than White faces (Greenwald, Poehlman, Uhlmann, & Banaji, 2008; Nosek & 10 others, 2007). The more strongly people exhibit such implicit prejudice, the readier they are to perceive anger in Black faces. Prejudice operates as an intuitive habit.

Intuitive Fears

With 9/11 images indelibly etched on their memories, and periodic news of terrorist plots and warnings, air travelers worry. In one 2006 Gallup survey, only 40 percent of Americans reported being "not afraid at all" to fly. Yet from 2005 to 2007, Americans were - mile for mile - 170 times more likely to die in an automobile or pickup truck crash than on a scheduled flight (National Safety Council, 2010).

In a late 2001 essay, I calculated that if - because of 9/11 - we flew 20 percent less and instead drove half those unflown miles, about 800 more people would die in the next year (Myers, 2001). When Gerd Gigerenzer (2004, 2006, 2007) checked this estimate against actual accident data (why didn't I think of that?) he discovered that the last three months of 2001 did indeed produce significantly increased U.S. traffic deaths. By the end of 2002, he estimated, 1500 Americans had "lost their lives on the road by trying to avoid the risk of flying." Long after 9/11, the terrorists were still killing Americans by sending them back to their cars.

From 2002 to 2005, 2.5 billion passengers took to the air on U.S. commercial flights. None died in major airline crashes (McMurray, 2006; Miller, 2005). Meanwhile, 172,000 Americans died in traffic accidents. For most people, the scariest part of flying should be the drive to the airport.

Why isn't it? Why do we intuitively fear the wrong things? Why do we so often fret over remote possibilities while ignoring much higher probabilities? (Why do some smokers, whose habit shortens their lives by an average five years, fret before flying - which, averaged across people, shortens their life by a day?) Psychological science points to four influences on our intuitions about risk.

We fear what our ancestral history has prepared us to fear. Our brains, road-tested in the Stone Age, prepare us to fear yesterday's risks - snakes, lizards, and spiders. And they prepare us to fear confinement and heights, and therefore flying.

We fear what we cannot control. Driving we control. Sitting in airline seat 26E, we feel less self-reliance. (Three hours after writing the last three sentences, a woman explained to me why she drives to visit distant relatives: "I don't like to fly. I like to be in control. If I could fly the plane I'd be fine.")

We fear what is immediate. The dangers of flying are mostly squeezed into the moments of takeoff and landing. The dangers of driving are spread across many moments to come, each trivially dangerous. Smoking's toxicity is not immediate; it kills in the distant future. Likewise, carbon emissions are only gradually and slowly creating climate change, which is the distant future's weapon of mass destruction.

We fear threats most readily available in memory. As we make intuitive judgments of risk, horrific images of terrorist acts - United Flight 175 slicing into the World Trade Center - are readily accessible. Such images and the associated emotions can hijack the rational mind, leading us to fear too little those things that claim lives undramatically, one by one, rather than in bunches. As Bill Gates has noted, each year a half million children worldwide - the equivalent of four 747s full of children every day - die quietly, one by one, from rotavirus, and we hearing nothing of it (Glass, 2004). Dramatic events capture our attention; probabilities don't.

So, intuition - spontaneous, automatic, unreasoned thoughts and feelings - builds on our experience and guides our lives. Intuition is often wise, but sometimes perilous, especially when it leads us to overfeel and underthink. Today's cognitive science amplifies our appreciation for intuition. And it bids us to check our gut reactions against reality.

Practical Intuition

When checking gut reactions against reality, what do we learn about intuition's powers and perils in various everyday realms? (For supporting documentation see Myers, 2004.)

Sports Intuitions

As nature abhors a vacuum, so the human mind abhors chaos. Show us randomness and we will find order - patterns, clusters, and streaks. Such is true of sports fans, coaches, players, and announcers. Show us a random sequence of baskets made and missed by 50 percent shooters and - not appreciating the streakiness of random data - we will find episodes where players have the "hot hand." Intuitively, players "know" to feed the ball to the player who's "in a zone" and coaches "know" to play that

player - despite study after study finding that previous shot outcomes give no added information (beyond knowing the player's overall shooting percentage). But try to tell that to any basketball fan or announcer. When a friend sent my textbook synopsis of the studies of Tom Gilovich and others to CBS basketball announcer Billy Packer, he replied with disbelief, saying, "Please tell the stat man to get a life."

In lesser known studies, the same misperception has been found in baseball and golf. A streak without hits creates the impression of a "slump" that suggests a player should be benched or coached to change. One analysis of four seasons of major league player data, from 501 player seasons with more than 500 at-bats, noted the sequence of outs and hits (or of failures and successes, including walks and sacrifices). Overall, reported Christian Allbright (1993), "the behavior of all players examined, taken as a whole, does not differ significantly from what would be expected under a model of randomness." A .280 hitter is about as likely to get a hit at the next at-bat, regardless of the outcome of the last at-bat, the last two at-bats, and so on up to the last 20 at-bats.

"Are you saying that basketball shooting and batting are nothing but chance?," people respond incredulously. No, athletic performance at any moment is surely influenced by many psychological and physical factors. But a skilled athlete's immediately preceding performance isn't one of them. So don't lose confidence in a skilled player who happens to have missed a couple shots or struck out a couple times.

Given random variability, coaches also have a tendency to "learn" that benching or haranguing a player after an exceptionally poor performance stretch can boost performance. Failing to appreciate natural regression - exceptional performance tends to regress toward normality - coaches may feel rewarded after punishing players for subpar performance when the player "improves," and punished after rewarding superb performance when the player then regresses.

Fans and coaches also intuitively connect "temporally contiguous" events. In a close game, the last, deciding basket seems more determinative of the outcome than all the equally contributive baskets scored earlier. Thus, at considerable cost, coaches may bench a star player for the rest of the half who picks up two fouls in the first five minutes - all to have that player available for the last five minutes when the game is

on the line. Better to have the star play 20 minutes, and be available at the game's end than play 30 minutes and foul out with five minutes left. "Have your prime time player available in prime time! How many times have you seen a game come down to the final basket?"

Nevertheless, intuition's powers also are evident in athletic performance. A baseball batter has .15 seconds to detect a pitch's speed, spin, and direction, estimate when and where it is going to pass by, and direct a coordinated series of body movements in response. After the batter launches the ball, the fielder instantly computes the ball's trajectory and intuitively knows how to greet its return to earth. Likewise, team sport athletes develop intuitive capacities to read developing plays, and deliver the ball or the puck toward empty spaces that, given the play pattern, they anticipate a teammate filling. There's no time to reason the sequence. Recall Herbert Simon's surmise: "Intuition is nothing more and nothing less than recognition."

Business Intuition

"People are not stupid," behavioral economist Robert Shiller (2000) has said. "But they have their limitations." Economic intuitions sometimes defy economic logic, as illustrated by phenomena such as "loss aversion" (leading investors to sell winners and hang on to losers), the "endowment effect" (demanding more to give up something than to buy it), the "sunk cost effect" ("too much invested to quit"), and overconfidence (which leads investors and money managers to think they can outguess the efficient market). One analysis of 66,465 discount broker accounts found that those who, bullish on their prognostications traded the most, substantially underperformed the market after trading costs (Barber & Odean, 2000). Another study of 35,000 broker accounts found that "men are more overconfident than women," trade more, and make less (Barber & Odean, 2001).

But then again, experienced entrepreneurs and managers do learn from experience. Over time, their experience accumulates associations, which cue their gut feelings. After all the "quantitative information that's already been analyzed by very smart people," reflected retired Johnson & Johnson CEO Ralph Larsen (2001), then comes the moment "when

I earn what I get paid. Because I will look at that information and I will know, intuitively, whether it's a good or bad deal." But this is an anecdote, which can be countered with stories of General Electric's flourishing under Jack Welch's data-driven management system, or the Boston Red Sox' World Series victory, supported by number-crunching general manager, Theo Epstein. Perhaps future research will clarify the optimum combination of managerial analysis and intuition.

Clinical Intuition

A parole board contemplates the risk of releasing a convicted rapist. A crisis intervention telephone counselor judges whether a caller is suicidal. Medical admissions committees weigh their impressions of a candidate against a prediction formula that combines grades, aptitude scores, and reference letter ratings. A school social worker ponders whether a youth's overheard threat was a macho joke, an incidental outburst, or a foreteller of violence. In such contests between head and heart, clinicians often discount cold calculations and vote with their hearts. Feelings can trump formulas.

Yet it's no secret that when researchers have pitted intuition against statistical prediction, the formula usually wins. Statistical prediction is fallible. But for predicting future behavior, human intuition - even professional intuition - is even more fallible. Ditto when it comes to discerning true memories from false memories (which feel and sound like real memories).

What has been the effect of these studies - and of related studies of illusory correlation, hindsight bias, belief perseverance, and confirmation bias - on clinical practice? "The effect," concluded Robyn Dawes (1989), "can be summed up in a single world: Zilch."

The point is not that clinical intuition is worthless. Sometimes predictive guidelines are not available and clinicians' reservoir of experience speaks loud and clear. Nevertheless, checking clinical intuition - discerning its wisdom and its limits, and learning how to undergird it with statistical prediction - is a hardheaded process than can pay kind-hearted dividends. As Adam Smith wrote in *The Wealth of Nations*, "Science is the great antidote to the poison of enthusiasm and superstition."

Interviewer Intuition

As any employment interviewer can testify, impressions form quickly. By the time a candidate has settled into the hot seat, animation, extraversion, warmth, and voice have already registered. "The handshake is everything."

Given our proficiency at reading traits from thin slices of behavior, it's no surprise that interviewers often feel confident in their ability to predict future job performance from an unstructured get-acquainted interview. What's shocking is what poor predictors interviewer intuitions actually are. They're better than handwriting analysis, report Frank Schmidt and John Hunter (1998) from a review of 85 years of personnel selection research. But such impressions are less informative than aptitude tests, work samples, job knowledge tests, and peer ratings of past job performance. Even the most extended of all interviews - the mate selection process - is not a notably great predictor of long-term marital success (especially when compared to the list of actuarial predictors potentially available to a savvy matchmaker). When passionately in love, it's hard to imagine being otherwise.

This "interview illusion" occurs, first, because interviewee's present intentions are less revealing than habitual behaviors. Intentions matter. Still the best predictor of who we will be is who we have been.

Second, interviewers much more often follow the successes of those they've hired than of those they've rejected. Experience informs our intuitions, but sometimes our experience is a biased sample of reality.

Third, we're biased to presume (think fundamental attribution error) that as people seem now - in this self-presentation situation - so they will be tomorrow in different situations. We underestimate the power of situations, including the interview context.

The better news is that structured interviews fare better (Campion, Palmer & Campion, 1998; Weisner & Cronshaw, 1988). When jobs are analyzed, job-relevant questions are scripted, interviewers are trained, and all applicants are treated similarly and rated on established scales, interviews prove more successful. Structured interviews feel less warm and fuzzy, but in one review of 150 findings they had double the predictive accuracy of seat-of-the-pants interviews.

Conclusion

The cognitive science beneath this article is fundamentally constructive. Those who explore intuition's powers and perils are like a physician who says, "You're functioning pretty well. Your heart's fine. Your lungs are clear. But your vision could use some correction."

More than most people realize, information processing occurs off-screen, with the results occasionally displayed on-screen. Intuition is adaptive. It enables us to drive on automatic. It feeds our creativity. But sometimes it leads us into ill-fated investments, fuels overconfident predictions, and even takes us into war. Awareness that intuition's vision could use some correction in realms from sports to business, commends disciplined training of the mind. The bottom line: Intuition is powerful. And intuition is perilous.

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Investigadores/*Researchers*: Prof. Deolinda Lima, Prof. Isaura Ferreira Tavares, Dra. Marta Pinto, Dra. Isabel Martins

16/04 - "Perceptual memory in the human visual system"
Instituição/*Institution*: Instituto Biofísico para a Investigação em Luz e Imagem (IBILI), Coimbra - Portugal
Duração prevista/*Estimated Duration*: 2006/02 - 2010/03
Investigadores/*Researchers*: Doutora Patrícia Margarida Piedade Figueiredo, Dra. Mafalda Cavalheiro Gomes Moreira Mendes, Dra. Maria Fátima Loureiro da Silva, Dr. João Abel Loureiro Marques Xavier, Dr. Carlos Gomes

35/04 - "Pronouns and Degeneration: Differences in Processes and Brain Locations involved in Pronoun Interpretation in Prodromal Alzheimer's Disease and in Healthy Ageing"
Instituição/*Institution*: Núcleo de Estudos e Intervenção Cognitivo-Comportamental, Coimbra - Portugal
Duração prevista/*Estimated duration*: 2005/10 - 2010/03
Investigadores/*Researchers*: Prof. José Augusto da Veiga Pinto de Gouveia, Prof. António Manuel Horta Branco, Dr. Horácio António de Jesus Firmino, Dr. José Augusto Simões Gonçalves Leitão, Prof. Maria Isabel Ferraz Festas

55/04 - "Describing the contents of consciousness: A study of the production of reports of mental imagery using parapsychological data, and a methodological review" – only abstract available
Instituição/*Institution*: Department of Sociology, University of York - UK
Duração/*Duration*: 2006/10 - 2009/02
Investigador/Researcher: Dr. Robin Wooffitt

84/04 - "A Consciência da Dor: alterações induzidas por Dor Crónica nos mecanismos neurobiológicos de aprendizagem, atenção e recompensa" - "Similar decision-making impairment in orbitofrontal cortex lesioned and chronic pain animals in a risk assessment task"
Instituição/*Institution*: IBMC - Instituto de Biologia Molecular e Celular, Porto - Portugal
Duração/*Duration*: 2005/01 - 2008/11
Investigadores/*Researchers*: Prof. Vasco Miguel Clara Lopes Galhardo, Prof. Deolinda Maria Valente Alves de Lima Teixeira, Dr. Miguel Santos Pais-Vieira, Dra. Clara Maria Pires Costa Bastos Monteiro

106/04 - "The effect of pre-sensory emotional primes on ESP performance, subject mood, and the Mere Exposure Effect"
Instituição/*Institution*: Rhine Research Center, Durham, NC - USA
Duração/*Duration*: 2005/11 - 2009/10
Investigadores/*Researchers*: Prof. James Carpenter, Dr. Christine Simmonds, Dr. Ferrell Carpenter

109/04 - "Extra-sensory perception under the condition of continuous sensory feedback (CSF) to the agent"
Instituição/*Institution*: Austrian Society for Parapsychology and Border Areas of Science, Vienna University - Austria
Duração prevista/*Estimated duration*: 2005/02 - 2010/03
Investigadores/*Researchers*: Prof. Peter Mulacz, Dr. Gunther Fleck, Prof. Erich Neuwirth, Engº Hans Georg Schutz, Ms. Helena Bedenicec

139/04 - "Psicofisiologia e detecção do engano: paradigma do conhecimento culpável" - "Psychophysiology and detection of delusion: paradigm of the guilty knowledge"
Instituição/*Institution:* Faculdade de Psicologia e Ciências da Educação, Universidade de Coimbra - Portugal
Duração /*Duration*: 2005/08 - 2010/03
Investigadores/*Researchers*: Prof. Doutor Carlos Fernandes da Silva, Prof. Doutor Rui Paixão, Dr. Paulo Joaquim Farinha Rodrigues, Prof. Doutor Jorge Manuel Amaral Silvério

2006

07/06 - "Further Investigations of the I Ching: Reliability and Replication Studies"
Instituição/*Institution*: Anomalous Psychology Research Unit, Dep. of Psychology, University of Adelaide – Australia
Duração/Duration: 2007/03 - 2008/05
Investigador/Researcher: Dr. Lance Storm

12/06 - "The impact of mindfulness meditation on visuomotor performance and awareness of action: an EEG study of short- and long-term meditators"
Instituição/*Institution*: Institute of Environmental Medicine and Hospital Epidemiology, University Hospital Freiburg - Germany
Duração/*Duration*: 2007/05 - 2009/11
Investigadores/*Researchers*: Prof. Stefan Schmidt, Dr. Jose Raul Naranjo

13/06 - "Vinculação em bebés institucionalizados e competência narrativa dos seus principais cuidadores: estudo sobre a actividade cardíaca do bebé na interacção com a figura de cuidados através do BioBeAMS 2.0" - "Linkage among Institutionalized babies and narrative competence of his primary caregivers: study on the baby's cardiac activity and his interaction with the caregiver using BioBeAMS 2.0"
Instituição/*Institution*: Centro de Investigação em Psicologia (CIPSi), Universidade do Minho, Braga - Portugal
Duração prevista/*Estimated duration*: 2007/04 - 2010/03
Investigadores/*Researchers*: Prof. Doutora Isabel Maria Costa Soares, Prof. Doutor João Paulo Silva Cunha, Prof. Doutora Margarida Isabel Rangel Santos Henriques, Prof. Doutora Carla Cristina Esteves Martins, Dr. Pedro Miguel Brito da Silva Dias

23/06 - "Massagem ao Bebé Prematuro em Cuidados Intensivos Neonatais: Efeito no Funcionamento Psicofisiológico dos Bebés e Pais" - "Premature Infant Massage in Neotal Intensive Care: Effect upon the Baby and Parents' Psychophysiological Performance"
Instituição/*Institution*: Cipsi, Universidade do Minho, Braga - Portugal
Duração prevista/*Estimated duration*: 2007/07 - 2010/04
Investigadores/*Researchers*: Prof. Doutora Bárbara Fernandes de Carvalho Figueiredo, Dra. Clara Sofia Domingues Paz Dias, Dra. Maria Alice Peixoto Freitas, Dra. Maria Agostinha Costa Andrade, Dra. Maria José Faria Novais Rebelo, Dra. Susana Nunes da Silva, Dra. Maria de Lurdes Alves Senra, Dra. Maria José Carvalho Ferreira, Dr. César Bessa Pinheiro Teixeira, Dra. Mariana Pinto Basto Teixeira, D. Diana Patrícia Pires Pinto, Dra. Mariana Bianchi de Aguiar, Dra. Ana Guedes, Dr. Pombeiro

30/06 - "Does calcium leak in the brain cause mental retardation?"
Instituição/*Institution*: Baylor College of Medicine, Texas - USA
Duração/*Duration*: 2007/01 - 2009/12
Investigadores/*Researchers*: Prof. Xander H.T. Wehrens, Dr. Subeena Sood, Dr. Priyanka Desai

31/06 - "The use of a biological marker, 5-HT2C genotype, as a predictor of motivation, adherence and weight loss in participants of an obesity intervention programme"
Instituição/*Institution*: Biomedical Research Centre and Centre for Sport and Exercise Science, Faculty of Health and Wellbeing, Sheffield - UK
Duração prevista/*Estimated duration*: 2007/04 - 2010/04
Investigadores/*Researchers*: Dr. Caroline Dalton, Dr. Jeff Breckon, Dr. Robert Copeland, Dr. Brian Hall, Prof. Gavin Reynolds

32/06 - "A review and analysis of conceptual frameworks in accounts of animal psi" – only abstract available
Instituição/*Institution*: Liverpool Hope University, Liverpool - UK
Duração prevista/*Estimated duration*: 2007/09 - 2009/10
Investigadores/*Researchers*: Dr. Diane Dutton, Dr. Carl Williams

36/06 - "The psychophysiology of neurological abnormalities in first episode psychosis and in healthy individuals - A study using multimodal brain imaging" - only abstract available
Instituição/*Institution*: Division of Psychological Medicine, Institute of Psychiatry, London - UK
Duração prevista/*Estimated duration*: 2007/03 - 2010/03
Investigadores/*Researchers*: Dr. Paola Dazzan, Prof. Philip McGuire, Dr. Carmine Pariante, Dr. Marta Di Forti, Dr. Julia Lappin, Dr. Valeria Mondelli

44/06 - "Brain Electric Activity in Meditation: Extension of Earlier Work and Hypothesis Testing" - only abstract available
Instituição/*Institution*: The KEY Institute for Brain-Mind Research, University Hospital of Psychiatry, Zurich - Switzerland
Duração prevista/*Estimated duration*: 2007/10 - 2010/04
Investigadores/*Researchers*: Prof. Dietrich Lehmann, Mr. Shisei Tei, Dr. Pascal Faber, Prof. Hiraoki Kumano, Dr. Lorena Gianotti, Dr. Roberto Pascual-Marqui

49/06 - "Exploring extrasensory perception under hypnosis stimulation: Personality, imagery, creativity dimension using emotional/neutral targets and relax-tension/hypnosis condition"
Instituição/*Institution*: Instituto de Psicologia Paranormal, Buenos Aires - Argentina
Duração/*Duration*: 2007/02 - 2009/01
Investigadores/*Researchers*: Dr. Alejandro Enrique Parra, Dr. Juan Carlos Argibay, Dr. Sérgio Matteucci

51/06 - "Hallucination Experience and PSI: A psychological, psychopathological, psychophysiological and transcultural approach"
Instituição/*Institution*: Universidad Abierta Interamericana, Facultad de Psicologia, Buenos Aires - Argentina
Duração/*Duration*: 2007/02 - 2009/01
Investigadores/*Researchers*: Dr. Alejandro Enrique Parra, Dr. Luis Santiago Espinoza Paul

54/06 - "Heterogeneity in high hypnotic suggestibility and its implications for the study of anomalous experiences"
Instituição/*Institution*: Department of Psychology, Lund University, Lund - Sweden
Duração prevista/*Estimated duration*: 2007/09 - 2010/01
Investigadores/*Researchers*: Dr. Devin Blair Terhune, Prof. Etzel Cardeña

57/06 - "The diurnal pattern of cortisol secretion in relation to season in healthy participants and those with seasonal affective disorder (SAD)"
Instituição/*Institution*: Psychophysiology and Stress Research Group, Dep. of Psychology and Human and Health Sciences, University of Westminster, London - UK
Duração/*Duration*: 2007/02 - 2009/05
Investigadores/*Researchers*: Prof. Angela Clow, Prof. Phil Evans, Prof. Frank Hucklebridge, Dr. Lisa Thorn

59/06 - "Probing the human mirror neuron system using EEG: action observation, error monitoring and empathy" – only abstract available
Instituição/*Institution*: Centre for Research in Cognition, Emotion and Interaction, School of Human and Life Sciences, Roehampton University, London - UK
Duração prevista/*Estimated duration*: 2007/04 - 2010/03
Investigadores/*Researchers*: Dr. Joseph Patrick Levy e Dr. Armanda H. R. Holmes, Dr. Lance Slade, Dr. Jonathan Silas, Dr. Maria Nielson

61/06 - "Neural Mechanisms of Temporal Discounting"
Instituição/*Institution*: Harvard Medical School, Dep. of Neurobiology, Boston - USA
Duração/*Duration*: 2007/02 - 2009/10
Investigadores/*Researchers*: Prof. Margaret Livingstone, Prof. Nancy Kanwisher, Dr. Johannes Haushofer, Dr. Camilo Libedinsky

62/06 - "The Pilgrimage Project: A study of motivations and experiences in sacred spaces"
Instituição/*Institution*: Ian Ramsey Centre, University of Oxford - UK
Duração/*Duration*: 2007/03 - 2010/02
Investigadores/*Researchers*: Dr. Miguel H. Farias, Dr. Alana Harris, Prof. Christina Aus der Au, Dr. Katja Wiech, Dr. Pedro Soares, Dr. Wiebke Friese

64/06 - "Brain Imaging Study of the Psychological Antecedents and Neural Correlates of Moral Judgement" - only abstract available
Instituição/*Institution*: Ian Ramsey Centre, University of Oxford - UK
Duração/*Duration*: 2007/02 - 2008/12
Investigadores/*Researchers*: Dr. Nicholas Shackel, Dr. Katja Wiech, Dr. Guy Kahane, Dr. Miguel Farias

65/06 - "Exploring the Relationship of Out-of-Body Experiences and Hallucinations: The Role of Depersonalization Experiences" – only abstract available
Instituição/*Institution*: Parapsychology Foundation Satellite Office, Virginia - USA
Duração/*Duration*: 2007/03 - 2009/05
Investigadores/*Researchers*: Prof. Carlos S. Alvarado, Dr. Nancy Zingrone

72/06 - "Required time for cognitive and motor activities in lucid dreams"
Instituição/*Institution*: University of Heidelberg, Institute for Sport and Sports Science, Heidelberg - Germany
Duração/*Duration*: 2007/01 - 2009/01
Investigadores/*Researchers*: Dr. Daniel Erlacher, Dr. Michael Schredl, Dr. Carmen Gebhart

78/06 - "ERP correlates of relational learning: Testing a behavioural model of word webs" - only abstract available
Instituição/*Institution*: Wales Institute of Cognitive Neuroscience, Dep. of Psychology, University of Wales, Swansea - UK
Duração/*Duration*: 2007/01 - 2009/03
Investigadores/*Researchers*: Dr. Simon Dymond, Prof. Lanny Fields

80/06 - "Understanding the role of dendrites in cortical information processing"
Instituição/*Institution*: Dep. of Psychology, Faculty of Arts and Sciences, University of Rijeka, Rijeka - Croatia
Duração/*Duration*: 2007/02 - 2010/02
Investigadores/*Researchers*: Prof. Drazen Domijan, Prof. Mladenka Tkalcic, Dr. Mia Setic, Prof. Ana Prorokvic, Dr. Pavle Valerjev

85/06 - "The occurrence, phenomenology and psychological correlates of Out-Of-Body and Near Death Experiences" – only abstract available
Instituição/*Institution*: Manchester University, Manchester - UK
Duração/*Duration:* 2007/06 - 2009/11
Investigadores/*Researchers*: Dr. Craig Murray, Dr. David J. Wilde

90/06 - "Advancing methodology in the psychophysiology of stress: capturing the complexity of immunity"
Instituição/*Institution*: Department of Psychology, Anglia Ruskian University, Cambridge - UK
Duração prevista/*Estimated duration*: 2007/07 - 2010/03
Investigadores/*Researchers*: Dr. Matt Bristow, Dr. Rachel Cook

98/06 - "The Meaning-Switch - Investigation of Pre-Cognition in an Operationally Closed System"
Instituição/*Institution*: T.REG Systems Research Labs, Staufen - Germany
Duração/*Duration*: 2007/07 - 2009/07
Investigadores/Researchers: Dr. Walter von Lucadou, Dr. Matthias Braeunig, Dr. Tilmann Faul

103/06 - "Psi Related Experiences and Spatialization: the use of geographic information systems to investigate spontaneous Psi Phenomena and experient profiling" – only abstract available
Instituição/*Institution*: Spatial Informatics Research and the Anomalous Experiences Research Unit, Department of Sociology, University of York - UK
Duração/*Duration*: 2008/10 - 2009/12
Investigadores/*Researchers*: Prof. Roger Burrows, Dra. Madeleine Castro

110/06 - "Paranormal Belief and Well Being: An Exploratory of Cognitive-Perceptual Bias"
Instituição/*Institution*: The Manchester Metropolitan University, Research Institute of Health and Social Change, Manchester - UK
Duração/*Duration*: 2007/02 - 2009/09
Investigadores/*Researchers*: Dr. Neil Andrew Dagnall, Dr. Gary Munley, Dr. Andrew Parker, Dr. Ken Drinkwater

120/06 - "Psicoendocrinologia do comportamento parental humano: Alterações hormonais, síndrome de Couvade e responsividade parental em pais-expectantes" - "Psicoendocrinology of the human parental behaviour: Hormonal changes, Couvade syndrome and parent responsivity in expecting-parents"
Instituição/*Institution*: Centro de Investigação e Intervenção, Instituto Superior de Psicologia Aplicada, Lisboa - Portugal
Duração/*Duration*: 2007/02 - 2009/01
Investigadores/*Researchers*: Prof. Isabel Maria Pereira Leal, Prof. Rui Filipe Nunes Pais de Oliveira, Prof. Luís Adriano Neves Gonçalves Sobrinho, Dra. Rita Maria Morgado Gomez

125/06 - "Psychophysiological effects of human pheromones"
Instituição/*Institution*: Centro de Estudos e Intervenção Social, ISCTE, Lisboa - Portugal
Duração prevista/*Estimated duration*: 2007/05 - 2010/01
Investigadores/*Researchers*: Prof. Francisco Gomes Esteves, Prof. Mats Olsson, Dr. Johan Lundstrom, Prof. Pedro Barbas de Albuquerque, Prof. Maria Benedita Monteiro, Prof. Maria Paula Carneiro, Dra. Patrícia Arriaga Ferreira

134/06 - "The role of stress in cortico-basal ganglia loop processing and instrumental conditioning"
Instituição/*Institution*: Life and Health Sciences Research Unit, School of Health Sciences, University of Minho, Braga - Portugal
Duração/*Duration*: 2007/01 - 2010/02
Investigadores/*Researchers*: Prof. Doutor Nuno Jorge Carvalho de Sousa, Dr. Rui Manuel Fernandes da Costa, Dr. Eduardo Miguel Gonçalves Dias Ferreira, Prof. Doutor João José Cardoso Cerqueira, Dr. Pedo Alexandre Teixeira

137/06 - "Influências das Emoções e dos Sentimentos na Percepção do Tempo Cronológico" - "Influence of Emotions and Feelings upon the Perception of Chronological Time" Instituição/*Institution*: Unidade de Investigação em Psicologia, do Desenvolvimento e da Educação, Instituto Superior de Psicologia Aplicada, Lisboa - Portugal
Duração prevista/*Estimated duration*: 2007/02 - 2010/03
Investigadores/*Researchers*: Prof. Teresa Maria Morais Garcia-Marques, Dr. Alexandre Constâncio Fernandes

147/06 - "Cognitive and affective trait effects of meditation-training on brain and behaviour. An event-related longitudinal fMRI study"
Instituição/*Institution*: Department of Psychology/Neuropsychology, University of Freiburg - Germany
Duração/*Duration*: 2007/03 - 2009/09
Investigadores/*Researchers*: Prof. Ulrike Halsband, Dr. Susanne Muller

154/06 - "High-frequency oscillations and rhythmic slow activity during virtual navigation, REM sleep and wake-sleep transitions: Studies on intracranial recordings in humans"
Instituição/*Institution*: Budapest-Bethel Epilepsy Center Foundation (BBEC), Budapest - Hungary
Duração/*Duration*: 2008/01 - 2009/10
Investigadores/*Researchers:* Prof. Péter Halász, Dr. Zsófia Clemens, Dr. Csaba Borbély, Dr. Daniel Fabó

157/06 - "Enhancing Hit Rates on Psi Tests with Optimal Levels of Transliminality"
Instituição/*Institution*: Integrated Knowledge Systems Inc., Springfield - USA
Duração/*Duration*: 2007/01 - 2008/07
Investigador/*Researcher*: Dr. James Houran

161/06 - "The relation of mind to body. Psychophysiological studies of the placebo effect"
Instituição/*Institution*: Department of Psychology, University of Tromso - Norway
Duração prevista/*Estimated duration*: 2007/01 - 2010/03
Investigadores/*Researchers*: Prof. Magne Arve Flaten, Prof. Oddmund Johansen, Dr. Terje Simonsen, Mr. Per M. Aslaksen, Mr. Peter Lyby, Dr. Espen Bjorkedal

162/06 - "Paranormal Healing, Paranormal Belief, and Physical and Psychological Well-Being"
Instituição/*Institution*: Koestler Parapsychology Unit, Psychology Department, University of Edinburgh - UK
Duração/*Duration*: 2007/01 - 2009/03
Investigadores/Researchers: Dr. Caroline Watt, Dr. Alison Easter

163/06 - "Effects of hypnotizability on EEG and autonomic concomitants of imagery and emotion production" – only abstract available
Instituição/*Institution*: Serbsky National Research Centre for Social and Forensic Psychiatry, Moscow - Russia
Duração/*Duration*: 2007/06 - 2009/07
Investigadores/*Researchers*: Dr. Zvonikov Vyacheslav Michailovich, Prof. Stroganova Tatiana Alexandrovna, Dr. Anna Kirenskaya, Dr. Vladimir Novototsky-Vlasov, Mr. Andrey Chistyakov

165/06 - "The sense of self in the brain: neural correlates of self-recognition"
Instituição/*Institution*: Department of Psychology, Royal Holloway, University of London - UK
Duração/*Duration*: 2007/09 - 2010/01
Investigadores/*Researchers*: Dr. Emmanouil (Manos) Tsakiris, Dr. Angela Sirigu, Prof. Patrick Haggard, Dr. Matteus Joffily

167/06 - "A Study to Assess the Validity of Applied Kinesiology (AK) as a Diagnostic Tool and as a Nonlocal Proximity Effect"
Instituição/*Institution*: Laboratories for Fundamental Research, California - USA
Duração/*Duration*: 2007/02 - 2010/01
Investigadores/*Researchers*: Dr. Stephan A. Schwartz, Dr. Ginette Nachman, Dr. William Frazer Morris

170/06 - "Seeing the future: Exploring presentiment with eye gaze and pupillary dilation" - only abstract available
Instituição/*Institution*: Institute of Noetic Sciences, California - USA
Duração/*Duration*: 2007/01 - 2008/10
Investigador/*Researcher:* Dr. Dean Radin

174/06 - "Experimental Investigation of a Psi Training Program"
Instituição/*Institution*: Institute of Noetic Sciences, California - USA
Duração/*Duration*: 2007/05 - 2009/01
Investigadores/*Researchers*: Dr. Marilyn Schlitz, Dr. Dean Radin, Dr. Cassandra Vieten, Dr. Colin Cherot

196/06 - "Effect of the comprehensive Art of Living yogic breathing programme on the physiological and psychological well-being"
Instituição/*Institution*: The Art of Living Foundation Croatia, Zagreb - Croatia
Duração/*Duration*: 2007/04 - 2009/09
Investigadores/*Researchers*: Dr. Sanja Kostrun, Dr. Irena Svenda, Dr. Sanja Kordic, Prof. Fahri Saatvcioglu, Mr. Hrvoje Tadic, Dr. Hujic Aleksandra

2008

23/08 - "A Test for Mindfulness – The Bistable Images Test"
Instituição/*Institution*: University of Northampton, School of Social Sciences - UK
Duração prevista/*Estimated duration*: 2009/01 - 2010/03
Investigadores/*Researchers:* Prof. Harald Walach, Dr. Ursula Mochty

56/08 - "The Sheep-Goat effect as a matter of compliance vs. noncompliance: The effect of reactance in a forced-choice ball selection test" - only abstract available
Instituição/*Institution*: Anomalistic and Transpersonal Psychology Research Unit, School of Psychology, Deakin University, Burwood - Australia
Duração prevista/*Estimated duration*: 2009/03 - 2010/04
Investigadores/*Researchers*: Dr. Lance Storm, Prof. Suitbert Ertel, Dr. Adam Rock

59/08 - "Generating Psi with optimal levels of Transliminality - a critical replication and extension"
Instituição/*Institution*: Integrated Knowledge Systems, Springfield - USA
Duração/*Duration*: 2009/01 - 2009/12
Investigador/*Researcher*: Dr. James Houran

66/08 - "Spirituality, religious coping and paranormal beliefs and their relation to OCD and anxiety disorders' symptomatology and treatment outcome"
Instituição/*Institution*: University Medical Centre UKE – Hamburg Eppendorf, Centre of Psychosocial Medicine, University Clinic of Psychiatry and Psychotherapy, Department for Anxiety Disorders, Hamburg - Germany
Duração prevista/*Estimated duration*: 2009/01 - 2010/04
Investigadores/*Researchers*: Dr. Agorastos Agorastos e Prof. Steffen Moritz, Prof. Michael Kellner, Dr. Christoph Muhtz

96/08 - "Brain Activity During PK and Facial Recognition Tasks – Research with near Infrared Spectroscopy"
Instituição/*Institution*: Bio-Emission Laboratory, International Research Institute (IRI), Chiba - Japan
Duração prevista/*Estimated duration*: 2009/01 - 2010/02
Investigadores/*Researchers*: Dr. Mikio Yamamoto, Dr. Hideyuki Kokubo

167/08 - "Testing the ontological status of the experience of meditation-induced timeless states" - only abstract available
Instituição/*Institution*: Institute of Noetic Sciences, Petaluma, California - USA
Duração prevista/*Estimated duration*: 2009/01 - 2010/01
Investigadores/*Researchers*: Dr. Cassandra Vieten, Dr. Dean Radin, Dr. Marilyn Schlitz

179/08 - "Percepção Extra-sensorial: um estudo acerca da possibilidade de visão heteroscópica" - "Extra-sensorial perception: a study on the possibility of heteroscopic vision"
Instituição/*Institution*: HUB – Hospital Universitário de Brasília e NEFP – Núcleo de Estudos dos Fenômenos Paranormais, Brasília - Brazil
Duração prevista/*Estimated duration*: 2009/01 - 2010/03
Investigadores/*Researchers*: Prof. Álvaro Luiz Tronconi, Prof. Moema da Silva Borges, Dr. Joel Paulo Russomano Veiga, D. Cleunice de Arruda Castro, Dr. Eloina Terezinha Domanski, D. Walkyria Eyre

PALESTRANTES E MODERADORES
SPEAKERS AND MODERATORS

Alexandre Castro-Caldas Professor de Neurologia, Director do Instituto de Ciências da Saúde da Universidade Católica Portuguesa, Lisboa. Foi Presidente da *International Neuropsychological Society*. Interesses científicos: literacia/iliteracia e ortografia e substratos neurobiológicos cerebrais, afasia e doença de Parkinson.

Professor of Neurology, Director of the Health Sciences Institute of the Catholic University of Portugal, Lisbon, Portugal. Past President of the International Neuropsychological Society. Research interests: literacy/illiteracy and orthography and brain neurobiological substrates, aphasia and Parkinson's disease.

Axel Cleeremans Director de Investigação, Seminário de Investigação em Ciências Cognitivas, Universidade Livre de Bruxelas, Bélgica. Co-investigador principal no projecto europeu de investigação *"Measuring Consciousness – Bridging the Mind Brain Gap"*. Autor de múltiplos artigos científicos sobre aprendizagem implícita e consciência e do livro *"The Unity of Consciousness: Binding, Integration and Dissociation"* e co-autor de *"The Oxford Companion to Consciousness"*. Interesses científicos: consciência e aprendizagem implícita, modelos de cognição consciente e não consciente, rede neuronal de processos cognitivos.

Research Director, Research Seminar in Cognitive Science, Free University Brussels, Belgium. Co-principal investigator on the European research project "Measuring Consciousness – Bridging the Mind Brain Gap". Author of numerous papers on implicit learning and consciousness and of the book "The Unity of Consciousness: Binding, Integration and Dissociation" and co-author of "The Oxford Companion to Consciousness". Research interests: consciousness and implicit learning, models of conscious and unconscious cognition, neural network of cognitive processes.

Caroline Watt Investigadora Sénior, Departamento de Psicologia, Universidade de Edimburgo, Escócia. *Past President da Parapsychological Association*, co-autora do livro *"An Introduction to Parapsychology"* e autora de artigos em livros e revistas científicas na área da parapsicologia e de crenças paranormais. Interesses científicos: efeitos da expectativa do experimentador e do participante, aspectos psicológicos de experiências e crenças paranormais evidentes e intensificação do desempenho remoto em tarefas cognitivas e comportamentais.

Senior Lecturer, Psychology Department, University of Edinburgh, Scotland. Past President of the Parapsychological Association, co-author of the book" An Introduction to Parapsychology" and author of journal articles on parapsychology and paranormal beliefs. Research

interests: experimenter and participant expectancy effects, psychological aspects of ostensible paranormal experiences and beliefs and remote performance enhancement with cognitive and behavioural tasks.

Cilia Witteman Professora de Tomada de Decisão Diagnóstica, Instituto de Ciências Comportamentais, Radboud University, Nijmegen, Holanda e Professora na Faculdade de Psicologia, Universidade de Bergen, Noruega. Docente em cursos de mestrado sobre tomada de decisão na clínica e psicodiagnóstico. Co-autora do livro *"Tracing Intuition: Recent methods in measuring intuitive and deliberate processes in decision making"*. Interesses científicos: processos de tomada de decisão e de representação do conhecimento em profissionais dos domínios médico e de saúde mental.

Professor of Diagnostic Decision-Making, Behavioural Science Institute, Radboud University, Nijmegen, Netherlands and Professor at the Faculty of Psychology, University of Bergen, Norway. Teacher in Master courses on clinical decision-making and psychodiagnosis. Co-author of the book "Tracing Intuition: Recent methods in measuring intuitive and deliberate processes in decision making". Research interests: knowledge representation and decision-making processes of professionals in the medical and mental health domain.

David Myers Psicólogo social, Docente comunicador de ciência psicológica, Hope College, Holland, Michigan, EUA. Autor de múltiplos artigos de divulgação científica em revistas como *Science, American Scientist* e *Psychological Science*. Autor de vários livros de texto de introdução à Psicologia e dos recentes *"Psychology"*, *"Psychology Study Guide", "Social Psychology"* e do *best-seller "Intuition: Its Powers and Perils"*. Os seus trabalhos de divulgação são apoiados pelo *National Science Foundation* e é reconhecido pelo *Gordon Allport Prize*. Interesses científicos: comunicação de investigação em psicologia.

Social psychologist, Lecturer communicator of psychological science, Hope College, Holland, Michigan, USA. Author of numerous papers of scientific communication in journals such as Science, American Scientist and Psychological Science. Author of several textbooks of introduction to Psychology and of the recent "Psychology", "Psychology Study Guide", "Social Psychology" and the best-seller "Intuition: Its Powers and Perils". His scientific writings are supported by the National Science Foundation and recognized by the Gordon Allport Prize. Research interests: communication of research in psychology.

Dick Bierman Regente (Jubilado) da Cadeira Heymans de Experiências Excepcionais, Universidade de Humanísticas, Utrecht, Holanda. Doutorado em Física Experimental,

Universidade de Amesterdão, Holanda. Interesses científicos: estudos da consciência, inteligência artificial, aprendizagem sob estados modificados de consciência (em especial durante o sono), papel das emoções não conscientes na tomada (intuitiva) de decisão, pré-sentimento (excitação corporal anómala, que precede acontecimentos emocionais), relação entre a física quântica e consciência.

Heymans Chair of Exceptional Experiences, University for Humanistics, Utrecht, Netherlands (Emeritus). PhD in Experimental Physics, University of Amsterdam, Netherlands. Research interests: consciousness studies, artificial intelligence, learning during altered states of consciousness (especially during sleep), non-conscious emotions and their role in (intuitive) decision-making, pre-sentiment (anomalous body arousal preceding emotional events), relation between quantum physics and consciousness.

Eugene Sadler-Smith Professor de Desenvolvimento em Gestão e Comportamento Organizacional, Escola de Gestão, Universidade de Surrey, Inglaterra. Editor-Chefe da revista *Management Learning*. Autor de múltiplos artigos de investigação nas áreas de aprendizagem e desenvolvimento e intuição. Autor dos livros *"Inside Intuition"* e *"The Intuitive mind: profiting from the power of your sixth sense"*. Interesses científicos: papel do juízo intuitivo na gestão da tomada de decisão e no desenvolvimento da gestão.

Professor of Management Development and Organizational Behaviour, School of Management, University of Surrey, UK. Editor-in-Chief of the journal Management Learning. Author of numerous papers on learning and development and intuition. Author of the books "Inside Intuition" and "The Intuitive mind: profiting from the power of your sixth sense". Research interests: role of intuitive judgement in management decision-making and management development.

Eva Lobach Docente, investigadora e Mestre em Metodologia da Psicologia, *Onderwijsinstituut Psychologie*, Universidade de Amesterdão, Holanda. Lecciona Métodos de Investigação Matemática, Estatística e SPSS aplicados à Psicologia e cursos de escrita científica em Psicologia. Supervisiona projectos de investigação de Mestrandos em Psicologia. Interesses científicos: processos fisiológicos não conscientes da intuição, metodologia em investigação conjunta de questões da psicologia e parapsicologia.

Lecturer, researcher and Master's degree in Psychological Research Methods, Onderwijsinstituut Psychologie, University of Amsterdam, Netherlands. Teaches Methods of Mathematics Research, Statistic and SPSS applied to Psychology and courses of scientific writing in Psychology. Supervises research projects of Master students in Psychology. Research interests:

non-conscious physiological processes of intuition, methodology combining psychology with parapsychology research questions.

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Emeritus Professor of General Physiology, University of Amsterdam, Netherlands, Professor "IST" of the Higher Technical Institute of Lisbon and Invited Professor of the Faculty of Medicine, University of Lisbon, Portugal. Research interests: electrophysiology of the brain, origin of epileptic phenomena, neuronal networks in relation to memory, attention and consciousness.

Hauke Heekeren Professor de Neurociência Afectiva e Psicologia da Emoção, Universidade Livre de Berlim, Alemanha. Director do Grupo de Investigação *"Neurocognition of Decision-making"*, *Max Planck Institute for Human Development*, Berlim. Vários prémios científicos por investigação de excelência. Consultor de várias revistas na área das neurociências. Interesses científicos: motivação e afecto na tomada de decisão, componentes cognitivos e afectivos na cognição social normal e perturbada e neuroimagem multimodal.

Professor of Affective Neuroscience and Psychology of Emotion, Free University Berlin, Germany. Head of the Research Group "Neurocognition of Decision-making", Max Planck Institute for Human Development, Berlin. Several scientific awards for excellence in research. Consultant for several journals on neuroscience. Research interests: motivation and affect in decision-making, cognitive and affective components in normal and disturbed social cognition and multimodal neuroimaging.

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Professor of Theory and Analysis of Large Scale Brain Signals, Charité (Faculty of Medicine), Head of Bernstein Neuroimaging Center, University of Berlin, Germany. Head of the Research Group "Attention and Awareness", Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany. Author and co-author of numerous scientific papers on neurosciences, especially neuroimaging. Research interests: cognitive neuroscience and neurobiology of motivation.

Marilyn Schlitz Presidente e CEO do Instituto de Ciências Noéticas, Petaluma, Califórnia, EUA. Cientista Sénior, Instituto de Investigação, *California Pacific Medical Center*. Professora Adjunta, Instituto de Psicologia Transpessoal, Palo Alto, Califórnia. Autora e co-autora de inúmeros artigos científicos sobre medicina alternativa e complementar. Co-autora dos livros *"Living deeply, The art and Science of Transformation"* e *"Consciousness & Healing: Integral Approaches to Mind Body Medicine"*. Interesses científicos: mecanismos internos de resposta curativa, capacidades humanas expandidas, medicinas alternativas e complementares e espiritualidade e saúde.

President and CEO, Institute of Noetic Sciences, Petaluma, California, EUA. Senior Scientist, Research Institute, California Pacific Medical Center. Adjunct Professor, Institute of Transpersonal Psychology, Palo Alto, California. Author and co-author of numerous papers on alternative and complementary medicine. Co-author of the books "Living deeply, The art and Science of Transformation" and "Consciousness & Healing: Integral Approaches to Mind Body Medicine". Research interests: inner mechanisms of the healing response, extended human abilities, alternative and complementary medicines and spirituality and health.

Mário Simões Professor de Psiquiatria e de Ciências da Consciência, Faculdade de Medicina de Lisboa. Director do Curso de Pós-Graduação em Hipnose Clínica e Experimental da Faculdade de Medicina de Lisboa. Interesses científicos: psicologia e psicofisiologia dos estados alterados de consciência, etnomedicina, experiências excepcionais humanas e psicologia e espiritualidade.

Professor of Psychiatry and Consciousness Sciences, Faculty of Medicine of Lisbon, Portugal. Director of the Post-Graduation Course in Clinical and Experimental Hypnosis, Faculty of Medicine of Lisbon. Research interests: psychology and psychophysiology of altered states of consciousness, ethnomedicine, human exceptional experiences and psychology and spirituality.

Nuno Crato Professor catedrático de Matemática e Estatística, Instituto Superior de Economia e Gestão, Lisboa. Pró-reitor da Universidade Técnica de Lisboa. Presidente da Sociedade Portuguesa de Matemática. Autor e co-autor de inúmeros artigos científicos nas áreas de Economia e Estatística e dos livros "A Matemática das Coisas" e "Passeio Aleatório". *Highest Citation Award do Applied Financial Economics*. Interesses científicos: processos estocásticos com aplicações computacionais, climatéricas e financeiras, divulgação científica em jornais e televisão e reflexão sobre o ensino.

Professor of Mathematics and Statistics, School of Economics and Management (ISEG), Lisbon. Dean of the Lisbon Technical University. President of the Portuguese Mathematical Society. Author and co-author of numerous papers on Economy and Statistics and of the books "A Matemática das Coisas" and "Passeio Aleatório". Highest Citation Award from the Applied Financial Economics. Research interests: stochastic processes with computer, weather and financial applications, scientific communication in journals and television and reflection on teaching.

Rui Mota Cardoso Professor de Psicologia, Faculdade de Medicina, e Psiquiatra, Porto. Fundador da Sociedade Portuguesa de Psicossomática e da Sociedade Portuguesa de Psicodrama. Interesses científicos: relação terapêutica e medicina psicossomática.

Professor of Psychology, Faculty of Medicine, and Psychiatrist, Oporto, Portugal. Founder of the Portuguese Society of Psychosomatics and Portuguese Society of Psychodrama. Research interests: the therapeutic relationship and psychosomatic medicine.

Richard Broughton Investigador e Docente Sénior, Divisão de Psicologia, Universidade de Northampton, Inglaterra. Membro da Direcção da *Society for Psychical Research*, Inglaterra. Consultor em projectos e autor de múltiplos artigos em livros e revistas científicas na área da parapsicologia. Autor do livro *"Parapsychology: The Controversial Science"*. Interesses científicos: intuição e tomada de decisão e respostas da condutância da pele.

Researcher and Senior Lecturer, Division of Psychology, University of Northampton, UK. Member of the Council of the Society for Psychical Research, UK. Consultant in projects and author of several book and journal papers on parapsychology. Author of the book "Parapsychology: The Controversial Science". Research interests: intuition and decision-making and skin conductance responses.

Seymour Epstein Professor Emérito de Psicologia, Universidade de Massachusetts, Amherst, EUA. Editor e consultor de várias revistas científicas nas áreas da personalidade e psicologia. Vários prémios científicos por investigação excepcional. Autor do livro *"Cognitive-experiential self-theory: An integrative theory of personality"* (em preparação). Interesses científicos: construto de uma teoria unificada da personalidade, pensamento construtivo, metodologia da investigação da personalidade, *stress e coping*.

Professor Emeritus of Psychology, University of Massachusetts, Amherst, USA. Editor and consultant of numerous journals on personality and psychology. Several scientific awards for exceptional research. Author of the book "Cognitive-experiential self-theory: An integrative theory of personality" (in preparation). Research interests: construction of a unified theory of personality, constructive thinking, methodology in personality research, stress and coping.

Thomas Goschke Professor de Psicologia Geral, Faculdade de Ciências, Director do Centro de Neuroimagem do Departamento de Psicologia e do Instituto de Psicologia Geral, Biopsicologia e Métodos em Psicologia, Universidade Técnica de Dresden, Alemanha. Consultor de várias revistas científicas na área da cognição. Interesses científicos: funções executivas, modulação emocional de processos cognitivos, acções intencionais, aprendizagem implícita e juízos intuitivos.

Professor of General Psychology, Faculty of Sciences, Acting Director of the Neuroimaging Center of the Department of Psychology and of the Institute for General Psychology, Biopsychology and Methods in Psychology, Technical University of Dresden, Germany. Consultant for several scientific journals on cognition. Research interests: executive functions, emotional modulation of cognitive processes, intentional actions, implicit learning and intuitive judgments.

Lista de Posters com resultados finais apresentados pelos bolseiros da Fundação Bial

Posters with final results presented by Bial Foundation researchers

2004

15/04 - "Pain control from the brain - Gene therapy in the treatment of chronic pain"
Instituição/*Institution*: Instituto de Histologia e Embriologia, Faculdade de Medicina da Universidade do Porto - Portugal
Duração/*Duration*: 2005/01 - 2009/01
Investigadores/*Researchers*: Prof. Deolinda Lima, Prof. Isaura Ferreira Tavares, Dra. Marta Pinto, Dra. Isabel Martins

Objectives: Develop new methods of manipulation of the supraspinal pain control system to correct the neurobiological changes induced by chronic pain. The studies were focused on two components of the supraspinal pain control system: the dorsal reticular nucleus (DRt) and the caudal ventrolateral medulla (VLM). These two areas were elected based on the profound knowledge of their participation in pain modulation at the spinal cord level. The DRt is involved in pain facilitation whereas the VLM appears to be involved in mixed effects (facilitatory and inhibitory).

Methods: Transduction of neurons by HSV-1 (Herpes-Simplex Virus, type 1) or lentiviral based constructs (replication- defective forms) and evaluation of nociceptive behaviours in sustained and chronic pain models. In the case of the DRt, three studies were performed using the following constructs and pain models: 1) HSV-1 vectors overexpressing pre-proenkephalin in monoarthritic animals; 2) HSV-1 vectors overexpressing mu-opioid receptors (MOR) in a neuropathic pain model; 3) HSV-1 vectors that reduce the release of noradrenaline in a neuropathic pain model. In the VLM, we studied the effect of overexpressing pre-proenkephalin in an inflammatory pain model.

Results: In summary, the studies demonstrated that chronic pain affects descending modulation and that gene transfer can correct those effects in a sustained manner. The studies indicate that during chronic pain, a depression in the expression of MOR at the DRt is associated with hyperalgesic effects induced by local injection of opioids. The hyeperalgesia induced by overexpression of enkephalins at the DRt can be switched to analgesia by overexpression of MOR. It is possible that the VLM does not undergo similar changes since local overexpression of enkephalins induces analgesia. A decrease of noradrenaline release at the DRt is analgesic probably because chronic pain increases the tonus of noradrenergic input to the DRt and facilitates pain modulation from this nucleus.

Conclusion: By allowing sustained and directed manipulation, gene transfer is an effective tool to study pain modulation from the brain. Vector constructs produced taking into account the specific changes induced by chronic pain in the brain will continue to be developed.

Publications (full papers):

1. Pinto M, Lima D, Tavares I. (2007). Neuronal activation at the spinal cord and medullary pain control centres after brief stimulation of an inflamed joint: a c-*fos* study in the monoarthritic rat. *Neuroscience*, **147**:1076-1089.

2. Pinto M, Castro AR, Tushdy F, Wilson SP, Lima D, Tavares I. (2008). Opioids modulate pain facilitation from the dorsal reticular nucleus. *Mol. Cell Neurosci*, **39**: 508-518.

3. Pinto M, Sousa M, Lima D, Tavares I. (2008) Expression of μ-opioid, $GABA_B$ and NK1 receptors in spinally-projecting neurons of the caudal medulla oblongata: implications for descending modulation of nociceptive transmission. *J. Comp. Neurol.,* **510**: 175-187.

4. Tavares I, Lima D. (2007). From neuroanatomy to gene therapy: searching for new ways to manipulate the supraspinal endogenous pain modulatory system. *J. Anatomy*, **211**: 261-268.

5. Martins I, Pinto M, Lima D, Wilson SP, Tavares I. (2008). Dynamic of migration of HSV-1 from a medullary pronociceptive centre: antinociception by overexpression of the preproenkephalin transgene". *Eur. J. Neurosci.,* **28**: 2075-2083.

Key words: Receptor expression; Animal models; Gene transfer; Viral vectors.

16/04 - "Perceptual memory in the human visual system"

Instituição/Institution: Instituto Biofísico para a Investigação em Luz e Imagem (IBILI), Coimbra - Portugal

Duração prevista/Estimated Duration: 2006/02 - 2010/03

Investigadores/*Researchers*: Doutora Patrícia Margarida Piedade Figueiredo, Dra. Mafalda Cavalheiro Gomes Moreira Mendes, Dra. Maria Fátima Loureiro da Silva, Dr. João Abel Loureiro Marques Xavier, Dr. Carlos Gomes

Introduction: It is a well established observation that plane inversion causes deterioration of performance in face discrimination tasks – the so-called face inversion effect (FIE). This phenomenon suggests that the human visual system contains specialized processing mechanisms that are more engaged by upright faces than by inverted faces or non-face objects. One prominent hypothesis proposes that such specialization results from extensive practice with upright faces, leading to expertise for this canonical orientation. Here, we aimed to investigate perceptual learning for faces presented in multiple orientations, by conducting both psychophysics and functional magnetic resonance imaging (fMRI) experiments.

Methods: We conducted two psychophysics experiments in which participants performed a same / different discrimination task (DT) on pairs of faces: for orientations ranging between 0 and 300° over one session (Experiment 1) and for a single orientation over four training sessions (Experiment 2). We then conducted an fMRI experiment to investigate the neural correlates of face perception at multiple orientations.

Results: A quadratic effect was observed across orientations for both reaction times and error rates, indicating a deterioration of performance away from 0° and towards 180°. In Experiment 2, we observed a main effect of session, indicating that participants became significantly faster and more accurate with training. Finally, when tested with a different orientation (240°) at the end of the last session, participants showed a similar performance compared with the trained orientation (120°), suggesting that transfer of learning across orientations took place.

Conclusions: In summary, we have showed a consistent effect of face orientation in both behavioural and neuroimaging results. Specifically, we found that participants gave more errors and were slower in their responses as faces were rotated away from 0º. In addition, performance was improved when participants underwent periods of training, both for trained and untrained orientations. Consistently with the expertise hypothesis, we also found a parametric modulation of fMRI activity in specialized visual brain areas, according to the quadratic behavioural effect of face orientation.

Publications:

- Gomes CA, Mendes M, Figueiredo P. (2009) Perceptual learning for multiple face orientations. Perception. Vol. 38 Supp., p. 79.
- Gomes CA, Mendes M, Figueiredo P. (2009) Perceptual learning for multiple face orientations. APPE 2009, Lisboa, Portugal.

Keywords: Face perception; Learning; Expertise; Psychophysics; fMRI.

35/04 - "Pronouns and Degeneration: Differences in Processes and Brain Locations involved in Pronoun Interpretation in Prodromal Alzheimer's Disease and in Healthy Ageing"

Instituição/*Institution*: Núcleo de Estudos e Intervenção Cognitivo-Comportamental, Coimbra - Portugal

Duração prevista/*Estimated duration*: 2005/10 - 2010/03

Investigadores/*Researchers*: Prof. José Augusto da Veiga Pinto de Gouveia, Prof. António Manuel Horta Branco, Dr. Horácio António de Jesus Firmino, Dr. José Augusto Simões Gonçalves Leitão, Prof. Maria Isabel Ferraz Festas

Objectives: The present study aims at characterizing the differences between young adults and healthy elderly with respect to the Event Related Potentials (ERPs) elicited by pronoun resolution. We target differences occurring in the early stages of such processing, during which syntactic structure plays the key role in identifying the pronoun's antecedent, as well as later stages, during which pragmatic inferences and referent integration within the discourse representation are deemed to occur. We hypothesized that, although syntactic processing is well preserved in the elderly group, the same group should show a hindered ability to process pragmatic inferences, namely inferences based upon breaches of pragmatic principles, requiring, in order to be detected, the prediction of the pronominal choice that would conform to the pragmatic principle at stake.

Methods:

Participants: 20 elderly (65-80 year old), 20 young adults (20-26 years old).

Materials: Gender agreement in 48 pairs of Portuguese complex sentences was manipulated in order to cause pronoun resolution either with the c-commanding NP (1: syntactic antecedent detection; breach of Grice's maxim of manner - an explicit pronoun occurs instead the portuguese null pronoun (*pro*), the most economic and common choice for this syntactic context) or with the NP in a genitive recess (2: discourse/semantic antecedent detection; No breach of pragmatic principles), *e.g.*

(1) **[**[*The butler*]MASC *of* [*the countess*]FEM**](i)MASC** quarreled with the servant to whom *he***(i)MASC** had lent some money.

(2) [[The employee]FEM of **[***the butcher***](i)MASC**]FEM quarreled with the client to whom *he***(i)MASC** had sold spoilt sausages.

Results: As expected, we found in both age groups an enhanced early, frontally dominant, negativity (250-450 ms time window), indexing a greater processing effort during the first processing stage of the pronoun in type 2 sentences. Also in line with our predictions, an enhanced Late Positivity (450-600 ms time window) emerges in type (1) sentences for the young adults, indexing the additional effort required to compute the pragmatic inference conveyed by the breach of Grice's maxim of manner. We interpret the absence of this effect in the elderly group as evidence of hindered predictive processing, which fails to provide the basis for the pragmatic inference.

Key-words: event-related potentials, anaphor resolution, ageing

55/04 - "Describing the contents of consciousness: A study of the production of reports of mental imagery using parapsychological data, and a methodological review" – only abstract available

Instituição/*Institution*: Department of Sociology, University of York - UK
Duração/*Duration*: 2006/10 - 2009/02
Investigador/*Researcher*: Dr. Robin Wooffitt

Objectives: A key objective of this project was to examine how people use communicative resources and linguistic tools to verbalise reflections on their own experience of consciousness. It is anticipated that the results of the project would be of benefit to parapsychologists interested in the ways in which mentations may reveal the working of anomalous communicative processes in ordinary consciousness.

Methods: Data consisted of audio recordings of the mentation stage of ganzfeld ESP experiments conducted at the Koestler Parapsychology Unit at the University of Edinburgh during the 1990s. These recordings were transcribed according to the conventions of conversation analysis.
Data were analysed using conversation analysis. This is a qualitative method for the examination of the structural, interpersonal and normative properties of naturally occurring verbal interaction. It has previously been used in study of experimenter-subject interaction in ganzfeld experiments, in studies of reports of spontaneous psi related experiences, and in studies of the language of psychic practitioners.

Results: The empirical analysis has discovered various communicative practices by which participants in ganzfeld experiment produce mentation reports. Analysis focused on
The institutional character of the discourse of mentation reports
(how descriptions of inner experience are designed to address the institutional, experimental and laboratory context in which the report is produced);
The management of rights and responsibilities
(how subjects display their tacit understanding of the normative obligations and expectations that underpin participation in laboratory procedures);
The playfulness of mentation discourse
(how subjects used poetic discourse in the mentations, and how these poetical features impinged on the content of the report).

Conclusions: In various publications, we have argued that, in the use of introspective data, it may be necessary for parapsychologists and consciousness researchers to try to take account of the social and interpersonal properties of discourse and communication. This is because what is taken to be the *content* of a report may be inextricability tied to the discourse practices through which it is made available to the researcher.

Publications

1. Wooffitt, R. and Holt, N. 'Poetic properties of introspective reports on consciousness' under review, *Text and Performance Quarterly.*
2. Wooffitt, R. and Holt, N. (2010) 'Silence and its organisation in the pragmatics of introspection' forthcoming, *Discourse Studies.*

3. Wooffitt, R. and Holt, N. (2010) 'Introspection as institutional practice: reflections on the attempt to capture conscious experience in a parapsychology experiment' in C. Murray and R. Wooffitt (Eds.) *Analysing Anomalous Experiences*, forthcoming, Special Edition, *Qualitative Research in Psychology*.
4. Wooffitt, R. and Holt N. (2008) 'Reporting on Consciousness: communication in mentation narratives' *Proceedings of the 51st Annual Convention of the Parapsychological Association* New York: The Parapsychological Association, 288-303.

Keywords: mentations, introspection, consciousness, discourse

84/04 - "A Consciência da Dor: alterações induzidas por Dor Crónica nos mecanismos neurobiológicos de aprendizagem, atenção e recompensa" - "*Similar decision-making impairment in orbitofrontal cortex lesioned and chronic pain animals in a risk assessment task*"

Instituição/*Institution*: IBMC - Instituto de Biologia Molecular e Celular, Porto - Portugal
Duração/*Duration*: 2005/01 - 2008/11
Investigadores/*Researchers*: Prof. Vasco Miguel Clara Lopes Galhardo, Prof. Deolinda Maria Valente Alves de Lima Teixeira, Dr. Miguel Santos Pais-Vieira, Dra. Clara Maria Pires Costa Bastos Monteiro

Abstract: Uncovering the roles of the orbitofrontal cortex and the amygdala in reward-based decision-making strategies has relied heavily in studies using discrete brain lesions. However, chronic pain patients also display risk-prone behavior even in the absence of discrete brain lesions. The main objective of this project was to study how chronic pain affects brain areas critical for reward processing.
For this we developed a novel Rodent Gambling Task in which naïve animals make consecutive choices between two levers that attribute rewards of different value and probability. After a prolonged training phase in which both levers give the same reward, in the probe trial we maintain one lever at 1 food pellet with 80% probability of reward - low risk lever – while the other lever gives 3 pellets but at only 30% probability – high risk lever. We found that control animals start the task with a preference for the high-risk lever, but progressively shift to the low-risk option, while animals with orbitofrontal or amigdalar lesions, and animals with chronic pain prefer the high-risk lever. Since no brain lesion is caused by the model of chronic pain, we performed an HPLC analysis and found a decrease in the levels of dopamine and serotonin at the OFC, with no significant changes in the amygdala. We extended these findings by chronically implanting multielectrodes and recording 96 neurons in awake-behaving animals performing four sessions of the RGT before and after induction of pain. We found that the neuronal instantaneous firing rate was correlated with the probability of choosing a specific lever in the majority of the recorded neurons. Moreover, we found that the fraction of risk-sensitive neurons recorded in each session predicted the overall behavioural risk-bias of the animal.
This project demonstrated that chronic pain changes the reward-aversion circuitry and that these changes are crucial for setting individual levels of risk preference.

Publications:

Pais-Vieira M et al (2009) Neuroscience, 161: 671-679.
Neugebauer V et al (2009) Brain Research Reviews, 60: 226-242.
Pais-Vieira M et al (2007) Neuroscience, 145: 225-231.

Keywords: pain, multielectrode neurophysiology, prefrontal cortex, reward

106/04 - "The effect of pre-sensory emotional primes on ESP performance, subject mood, and the Mere Exposure Effect"

Instituição/*Institution*: Rhine Research Center, Durham, NC - USA
Duração/*Duration*: 2005/11 - 2009/10
Investigadores/*Researchers*: Prof. James Carpenter, Dr. Christine Simmonds, Dr. Ferrell Carpenter

Abstract: Two studies were carried out to test the general prediction from First Sight Theory that psi processes continuously contribute unconsciously to the formation of all experience and behavior. The expression of preferences was chosen to demonstrate these effects, as well as the effects of subliminal stimuli. Positively-toned pictures were exposed subliminally and used as ESP targets in order to influence subsequent preferences, as in a typical study of the Mere Exposure Effect. In both studies the mood of the percipient was manipulated and assessed, and several stable characteristics of personality and interest that were previously found to affect extrasensory and subliminal effects were measured. In the first study pre-exposed pictures were not preferred overall compared to ones not pre-exposed. Extrasensory influence was predicted successfully by several variables, particularly with participants in a positive mood. Several predictor variables were correlated with each other, so multiple regression was used to determine that Openness to Fantasy, Tolerance for Merger and Vulnerability (negative) were independently significant predictors. Subliminal influence was predicted by Need for Cognition and Unconscious Orientation. These relationships were tested again in the second study and the predictions of ESP influence were confirmed but the predictions of subliminal influence were not. Prediction of extrasensory effects was again strongest with persons in positive moods. It is concluded that extrasensory influences do contribute unconsciously to preference experiences in ways that are consistent with findings of previous research and the expectations of theory. A model is suggested in which experience is influenced contextually by both extrasensory and subliminal information in a continual way, but that these influences are moderated by an individual's emotional state and then moderated again by characteristic patterns of interests, needs and goals. These studies are part of a program of research intended to elucidate how extrasensory perception functions unconsciously and continuously in everyday life. A report on study one was presented to the Parapsychology Association in August, 2009.

Keywords: extrasensory, subliminal, first sight, openness, preference

109/04 - "Extra-sensory perception under the condition of continuous sensory feedback (CSF) to the agent"

Instituição/*Institution*: Austrian Society for Parapsychology and Border Areas of Science, Vienna University - Austria

Duração prevista/*Estimated duration*: 2005/02 - 2010/03

Investigadores/*Researchers*: Prof. Peter Mulacz, Dr. Gunther Fleck, Prof. Erich Neuwirth, Engº Hans Georg Schutz, Ms. Helena Bedenicec

Objectives: This experiment is a computerized conceptual replication of the classical Brugmans, Heymans, and Weinberg study of 1920. The basic idea is that the agent may modify his mental picture according to the actions of the percipient which he monitors continuously. The experiment is to test the hypothesis that this constant feedback would lead to an improved overall performance even with subjects that are not known as being specifically gifted. The results are to be analyzed in respect of correlations to different personality traits.

Methods: The experiment is run on two notebook computers, located in not adjacent rooms, linked together by a WLAN. The program displays on both screens a grid divided into 36 rectangles. An RNG selects the target rectangle, highlighted on the agent's computer only. The agent tries to 'influence' the percipient (or the percipient tries to pick up the agent's mental picture). The percipient will move his mouse pointer to what he feels is the target rectangle; the actual trial is finished by mouse-click. The pointer of the percipient's mouse is displayed all the time on the agent's screen, permitting him to monitor the percipient's movements and to change his own intention how to influence the percipient accordingly.

Subjects came in pairs with an emotional bond. Prior to the experiment, they had to fill in various questionnaires.

Results: Following a pilot experiment during which several variations have been tested (number of rectangles, mouse pointer of percipient visible or not, feedback after single trial or not, etc.) a total of 52 pairs of subjects has undergone the experiment that makes a total of 5597 single trials scoring 180 hits (vis-à-vis an expectation of <160).

No decline effect (quarter distribution) could be established.

Conclusions: The experiment yielded positive results albeit far away from the scores of the original Brugmans experiment (yet further analysis is needed). Frequent break-downs of the Java applet (clustering only with certain subjects) may indicate PK effects on the software.

Publications: It is planned to present the results at convention of the Parapsychological Association first and to get them published in one of the PA's affiliated journals thereafter.

Keywords: Telepathy, Sensory Feedback, Conceptual Replication

139/04 - "Psicofisiologia e detecção do engano: paradigma do conhecimento culpável" - "Psychophysiology and detection of delusion: paradigm of the guilty knowledge"

Instituição/*Institution*: Faculdade de Psicologia e Ciências da Educação, Universidade de Coimbra - Portugal

Duração /*Duration*: 2005/08 - 2010/03

Investigadores/*Researchers*: Prof. Doutor Carlos Fernandes da Silva, Prof. Doutor Rui Paixão, Dr. Paulo Joaquim Farinha Rodrigues, Prof. Doutor Jorge Manuel Amaral Silvério

Objectives: From mid-twentieth century, the detection of deception has become recognized as an object of scientific study, especially in the case of guilty knowledge. Nevertheless, the interpretations depend on the human factor. Thus, we tried to demonstrate that you can automate the detection of deception from psychophysiological records in order to avoid bias attributable to the researcher. For this we identify differences in SCR between "truth" and "deception". We will use other psychophysiological measures to increase the effectiveness of this algorithm.

Method: *Participants:* 17 participants, aged between 20 and 30 years of age (M = 23.18, SD = 2.74), 9 of them female.
Materials: A Biofeedback I-330-C2+ (J & J Engineering) system, connected to a laptop for recording digital data of skin conductance. A computer with a standard monitor. Soap, paper cloth, cup electrodes Ag / AgCl.
Procedures: We used a test-retest methodology. To this end we resort to a presentation of a sequence of 20 letters for 30s. each, without intervals between them. The presentation was performed using Microsoft © PowerPoint 2002 SP3. The subject had selected one of the cards before the trial. Participants had been instructed to "lye" throughout the procedure, saying "this is not the chosen card" before ALL presentations.

Results: The results show statistically significant differences between the situations in which the subject is telling the truth and those in which he "deceits". Differences were found for the rise-time t(542)=-2.444, p=0.015 and for the amplitude t(33.889)=-3.041, p=0.005. It was constructed a decision algorithm in order to distinguish “truth” from “deceit”. This provided significant results in relation to the difference between truth and deception (t (33.403) =- 10.409, p = 0.000). As a test, we used the same values, but this time trying to predict the card in which he would be deceiving us. Individually we were able to identify 71% of the times in which the subject was deceiving. Combining test data with retest data we were able to identify 82% of the time in which he tries to deceive.

Conclusions: The SGR signal collected from the created situation allows distinguishing the true situation of the deceit situation. It was also possible to create an algorithm that allowed the automatic detection of situations of deception. This algorithm will be expanded and improved to integrate other psychophysiological measures in order to become more efficient.

Publications:

1. Rodrigues, P. (2007). *Psicologia experimental: Um olhar psicofisiológico.* Comunicação apresentada na conferência «Um olhar pedagógico sobre a psicologia», Universidade da Beira Interior – Covilhã.
2. Rodrigues, P., Silva, C., Moura, J., Paixão, R., Nascimento, C. (2008). *Psicofisiologia e Engano: Efeito do conhecimento culpado (estudo piloto)* no congresso anual da Associação Portuguesa de Psicologia Experimental: Universidade de Faro
3. There are still being prepared two papers.

Keywords: Deception; psychophysiology; guilty knowledge paradigm.

2006

07/06 - "Further Investigations of the I Ching: Reliability and Replication Studies"
Instituição/*Institution*: Anomalous Psychology Research Unit, Dep. of Psychology, University of Adelaide – Australia
Duração/*Duration*: 2007/03 - 2008/05
Investigador/*Researcher*: Dr. Lance Storm

Abstract: The aim of the present study (Bial Grant 07/06) was to find evidence that a paranormal process undescores the *I Ching*, an ancient Chinese system of divination. Traditionally, users throw three coins, six times, to generate one of 64 six-line symbols called 'hexagrams', and then they consult the associated divinatory reading. Prior to throwing the coins, and in response to emotional or cognitive states of mind, a total of 150 participants pre-selected from the Hexagram Descriptor Form 16 of 64 descriptor-pairs that epitomized the meanings associated with the corresponding hexagrams. If one of the descriptor-pairs matched the outcome reading, it was deemed a hit (P_{MCE} = .25). Participants also rated the meaningfulness of their readings. It was theorised that hexagram targeting may accord with participants' time perspectives: either a present time perspective (PTP) or a future time perspective (FTP). Time perspective was derived from the Time Perspective Inventory (Zimbardo & Boyd, 1999). It was hypothesised that PTP types prefer first-hexagrams, and FTP types prefer second hexagrams. As hypothesised, the hit rate for PTP types on first-hexagram hitting (30%) exceeded the hit rate for FTP types (25%), although the difference was not significant. The hit rate for FTP types on second-hexagram hitting (22%) did not exceed the hit rate for PTP types (27%). Hit rates were above chance on first-hexagram hitting (25.3%), but below chance on second-hexagram hitting (24.6%). Neither effect was significant. First-hexagram hitters rated their readings significantly higher (73%) on meaningfulness than first-hexagram missers (65%), p = .04. A marginally significant aggregated hexagram hit rate of 27% across six *I Ching* studies was also found (p = .072). Two judges rated the 64 descriptor pairs of the Hexagram Descriptor Form. Mean descriptor-pair ratings ranged between 60% and 82%. The experimental *I Ching* method was tested against three control methods. For the control methods, only 4.5% of the results were significant or near-significant which could all be attributed to chance, but 14% of test results using the experimental method were significant or near-significant. Evidence was weak that time perspective predicted hexagram outcomes, but there was some statistical evidence that the *I Ching* method of choice produced non-chance outcomes, and participants who saw meaningfulness in their readings tended to successfully predict their *I Ching* hexagram.

Publications:
Storm, L. (2009). Investigations of the *I Ching*: II. Reliability and validity studies. *Australian Journal of Parapsychology*, *9*, 111-142.
Storm, L. (2008). Investigations of the *I Ching*: I. Relationships between psi, time perspective, paranormal belief and meaningfulness. *Australian Journal of Parapsychology*, *8*, 103-127.

Keywords: ESP, PK, *I Ching*, psi, synchronicity

12/06 - "The impact of mindfulness meditation on visuomotor performance and awareness of action: an EEG study of short- and long-term meditators"
Instituição/*Institution*: Institute of Environmental Medicine and Hospital Epidemiology, University Hospital Freiburg - Germany
Duração/*Duration*: 2007/05 - 2009/11
Investigadores/*Researchers*: Prof. Stefan Schmidt, Dr. Jose Raul Naranjo

Objectives: Awareness of action involves the ability to distinguish ones own actions and their sensory consequences from actions generated by external agents. It is still unclear if and how meditation enhances sensory-motor integration and awareness of action. The aim of this study was to investigate the motor error, the motor awareness and movement time (MT) in mindfulness meditators in a conflicting reaching task.

Methods: Participants were given a visual representation of their reaching movement by a video projector but they could not see their own movements directly. In the reaching task a gradually growing fals feedback was introduced by an angular deviation between the actual movement trajectory and the trajectory fed back to the participants. This task was presented to 11 novices in meditation before and after intensive 8 weeks of MBSR training. This sample was compared with a group of 9 long-term meditators and a group of 11 non-meditators. Dependent variables were (i) deviations of the reaching trajectory from a straight line (motor errors). (ii) angle at which participants got aware of the introduced mismatch (threshold) (iii) movement time to reach the target.

Results: Long-term meditators had lower motor errors (group x angle interaction: p=.08) than non-meditators. This was accompanied by larger movement time (side x group interaction: p=.056). Compared to non-meditators, novices to meditation had lower motor errors after the MBSR intervention (time x group interaction: p=.068), lower angular threshold (p=.06) and larger movement time (p=.016).

Conclusions: Mindfulness meditation is associated with decreased behavioral reactivity and slowing down. These changes lead to better motor performance and to detect lower levels of perceptual-motor conflict. We propose that mindfulness meditation entails a behavioral shift towards an 'expanded tempo', which facilitates a broader access to sensorimotor and proprioceptive signals. With this 'inner openness' to the movement experience, moment-by-moment monitoring of body states could be realized and online re-adjustment of movement trajectory is optimized. These considerations reinforce the positive impact that mindfulness meditation has on perceptual-motor control and awareness of action.

Keywords: motor awareness, self-agency, mindfulness meditation, MBSR

13/06 - "Vinculação em bebés institucionalizados e competência narrativa dos seus principais cuidadores: estudo sobre a actividade cardíaca do bebé na interacção com a figura de cuidados através do BioBeAMS 2.0" - "Linkage among Institutionalized babies and narrative competence of his primary caregivers: study on the baby's cardiac activity and his interaction with the caregiver using *BioBeAMS 2.0*"

Instituição/*Institution*: Centro de Investigação em Psicologia (CIPSi), Universidade do Minho, Braga - Portugal

Duração prevista/*Estimated duration*: 2007/04 - 2010/03

Investigadores/*Researchers*: Prof. Doutora Isabel Maria Costa Soares, Prof. Doutor João Paulo Silva Cunha, Prof. Doutora Margarida Isabel Rangel Santos Henriques, Prof. Doutora Carla Cristina Esteves Martins, Dr. Pedro Miguel Brito da Silva Dias

Objectives: To develop a new version of *BioBeAMS*, a multimedia system allowing the collection and analysis of children's cardiac activity, and to examine, in a group of institutionally-reared children, the relations among child's attachment disordered behaviors, caregiver's narrative competence, and child's cardiac activity during interaction tasks with the institutional caregiver.

Method:

Participants

40 institutionalized children (19 females) aged 9 to 30 months (Mean = 19.9; SD=6.66) and their caregivers were recruited in 12 institutions (Mean age at the time of admission = 8.35, SD=7.77; Mean length of time spent by the children at the institution = 11.53, SD=4.58).

Measures

Disturbances of Attachment Interview (Smyke & Zeanah, 1999); Rating of Infant and Stranger Engagement (Atlas-Corbett, Riley & Lyons-Ruth, 2005); Strange Situation Procedure (SSP; Ainsworth et al., 1978); Bio-Behavior Attachment Multimedia System - BioBeAMS 2.0 (Soares, Dias, Rangel, Martins, & Cunha, 2008); Caregivers' narrative competence (Gonçalves et al., 2001); Infant Characteristics Questionnaire (Bates, Freeland, & Lounsbury, 1979); Bayley Scales of Infant Development III (Bayley, 2006).

Procedures

Children were connected to 3 electrodes attached to the wireless signal acquisition box placed on a backpack. Episode 2 of the SSP was defined as the baseline for the cardiac activity. Next, two routine interaction tasks (1. caregiver telling a story using a picture book, and 2. feeding the child while telling a story) were carried out.

Results: A negative association between caregivers' narrative complexity and children's language was found, suggesting a higher stimulation from the caregivers when verbally interacting with these children in a structured task. Furthermore, children with less difficult temperament seem to have caregivers who tell more structured narratives. Indiscriminate behavior was correlated to cardiac activity during the routine tasks and the SSP; a decreased heart rate was found during interaction with stranger and a decreased LF/HF ratio was found when caregiver leaves.

Discussion: BioBeAMS 2.0 is a valuable resource for studying cardiac activity in interaction tasks with young children. Results suggest that caregivers' narrative competence is relevant to the quality of interaction with institutionalized children. Finally, indiscriminate behavior seems to be related to cardiac activity during interactions with the caregiver, in particular during separation situations.

Presentations at Scientific Meetings:

1. Effects of institutional rearing on infants' physical growth, neuro-cognitive functioning and social-emotional development: Preliminary data

Isabel Soares, Joana Silva, Sofia Marques, Joana Baptista, Mariana Pereira, Nuno Sousa, Margarida Rangel, Joana Palha, Pedro Dias & Carla Martins. Poster presented at the 39th Annual Meeting of the Jean Piaget Society, Park City, UT, USA, 4-6 June 2009

2. Caregiver's narrative competence and child's development: An exploratory comparison study with a normative group and a risk group with institutionalized children

Margarida R. Henriques, Isabel Soares, Marlene Sousa, Joana Baptista, Pedro Dias, Ana Moreira, Joana Silva, Sofia Marques, Mariana Pereira, & Emília Moreira. Poster presented at the 39th Annual Meeting of the *Jean Piaget Society*, Park City, UT, USA, 4-6 June 2009

3. Effects of institutionalization on infants' physical growth, mental development, temperament, neuro-endocrine, and social-emotional functioning: Preliminary data

Isabel Soares, Joana Silva, Sofia Marques, Joana Baptista, Mariana Pereira, Ana Mesquita, Diana Teixeira, Nuno Sousa, Margarida Rangel, Joana Palha, Pedro Dias, & Carla Martins. Poster presented at the 40th International Annual Meeting of the Society for Psychotherapy Research, Santiago do Chile, 24-27 June 2009

4. Attachment disordered behaviours in institutionalized children, cardiac activity and caregivers' narrative competence

Pedro Dias, Joana Baptista, Isabel Soares, Margarida Henriques & Elizabeth Carlson. Paper presented at the International Attachment Conference, Barcelona, 2-4 October, 2009

5. *Attachment disordered behaviours in Portuguese institutionally-reared children*: *Preliminary data*

Isabel Soares, Paula Oliveira, Joana Silva, Sofia Marques,Ana Mesquita,Carla Martins, Karlen Lyons-Ruth, & Charles Zeanah. Paper presented at the International Attachment Conference, Barcelona , 2-4 October, 2009

6. *Trastornos del apego en niños institucionalizados: Actividad cardiaca en la Situación Extraña, temperamento, contexto familiar y institucional*

Isabel Soares, Pedro Dias, Joana Silva, Sofia Marques, Joana Baptista, Paula Oliveira, Filipa Machado, Diana Teixeira, Ana Raquel Mesquita, Nuno Sousa, Joalha Palha, Margarida Henriques, Carla Martins, & Elisabeth Carlson. Poster presented at the 10th Meeting of the International

Attachment Network - Iberoamerican Section, Madrid, 22-24 October 2009.

7. *Un método observacional para evaluar el comportamiento de vinculación indiscriminado: Un estudio con niños institucionalizados y niños criados en casa*

Paula Oliveira, Karlen Lyons-Ruth, Isabel Soares, Joana Silva, Joana Baptista & Sofia Marques Poster presented at the 10th Meeting of the International Attachment Network - Iberoamerican Section, Madrid, 22-24 October 2009

Keywords: institutionally reared children, child-caregiver interaction, attachment, narrative competence, cardiac activity

23/06 - "Massagem ao Bebé Prematuro em Cuidados Intensivos Neonatais: Efeito no Funcionamento Psicofisiológico dos Bebés e Pais" - "**Premature Infant Massage in Neotal Intensive Care: Effect upon the Baby and Parents' Psychophysiological Performance"**
Instituição/*Institution*: Cipsi, Universidade do Minho, Braga - Portugal
Duração prevista/*Estimated duration*: 2007/07 - 2010/04
Investigadores/*Researchers*: Prof. Doutora Bárbara Fernandes de Carvalho Figueiredo, Dra. Clara Sofia Domingues Paz Dias, Dra. Maria Alice Peixoto Freitas, Dra. Maria Agostinha Costa Andrade, Dra. Maria José Faria Novais Rebelo, Dra. Susana Nunes da Silva, Dra. Maria de Lurdes Alves Senra, Dra. Maria José Carvalho Ferreira, Dr. César Bessa Pinheiro Teixeira, Dra. Mariana Pinto Basto Teixeira, D. Diana Patrícia Pires Pinto, Dra. Mariana Bianchi de Aguiar, Dra. Ana Guedes, Dr. Pombeiro

Objectives: To study the impact of premature infant massage on the mother and father's anxiety and depression symptoms and marital relationship, as well as in their emotional involvement with the infant.

Participants: 30 mothers and 30 fathers that had a preterm baby with less than 34 weeks and/or 1500g admitted to a Neonatal Intensive Care Unit (NICU) (Oporto Hospital Centre. Portugal) between July 2007 and December 2008 were enroll on an infant massage protocol.

Instruments: Self-measure questionnaires were used to assess mother and father depression (EPDS, Edinburgh Postnatal Depression Scale), anxiety (STAI, Stait Trait Anxiety Inventory), couple relationship (RQ, Relationship Questionnaire), and emotional involvement (BS, Bonding Scale) with the infant.

Procedures: Mother and fathers were assessed in two stages: in the NICU they were asked for informed consent and self-measure questionnaires (pre-test), 1 month later (pos-test) they were assessed using the same instruments from stage one. In between the mother and father were taught how to massage, and provide massage to their infant once a day in the NICU and later at home.

Results: No significant differences were found between measuring time points [F(3,9)=1,65;p=0,23]. No significant differences were found between pre and post-test measurement of mother/father's anxiety [F(1)=1,17;p=0,30], depression [F(1)=3,14;p=0,10], couple relationship [F(1)=3,24;p=0,09], and emotional involvement with the infant [F(1)=2,27;p=0,15]. No significant differences were found between gender [F(3,9)=1,34;p=0,31]. This also applies to gender differences in anxiety [F(1)=1,68;p=0,22], depression [F(1)=2,62;p=0,13], couple relationship [F(1)=1,92;p=0,19], and emotional involvement with the infant [F(1)=3,10;p=0,10]. The interaction between measuring time points and gender was also not significant [F(3,9)=1,56;p=0,25].

Conclusion: Although not significantly at this stage, results regarding mothers' anxiety and depression (but not results regarding mothers' couple relationship and involvement with the infant) and results regarding fathers' emotional involvement with the infant (but not results regarding fathers' anxiety, depression and couple relationship) pointing to our general hypothesis – over time the depressive and anxious symptoms decrease in mothers and the emotional involvement with the infant increase in fathers who provide massage to their premature infant. Generally men and women behave similarly, but while mother emotional involvement with the infant decrease over time, in the father it increases.

Publications:

Bianchi Aguiar, M. & Figueiredo, B. (2009). Prematuridade e baixo peso à nascença. *Nursing*, *in press*.

Figueiredo, B., & Aires Pereira, M. (2010). Anxiety, depression and marital relationship in preterm and term mothers and fathers. *Journal of Developmental & Behavioral Pediatrics, submitted.*

Figueiredo, B., & Aires Pereira, M. (2010). Premature infant massage improves mother and father's well-being.

Keywords: infant massage, preterm infants, preterm mothers and fathers, Neonatal Intensive Care Unit.

30/06 - "Does calcium leak in the brain cause mental retardation?"
Instituição/*Institution*: Baylor College of Medicine, Texas - USA
Duração/*Duration*: 2007/01 - 2009/12
Investigadores/*Researchers*: Prof. Xander H.T. Wehrens, Dr. Subeena Sood, Dr. Priyanka Desai

Abstract: Mental retardation (MR) is a symptom of multiple etiologies including chromosomal abnormalities, genetic defects and perinatal causes. MR refers to substantial limitations in present functioning and has important psychological implications for affected individuals. Disruption of the cellular calcium homeostasis has been associated with the pathogenesis of impaired cognition in human pathological conditions such as MR and Alzheimer's disease. Calcium signaling in neurons is tightly controlled to ensure proper functioning of numerous Ca-dependent processes. Two major sources contribute to cytosolic calcium signals: an extracellular pool entering via plasma membrane channels, and an internal reservoir in the endoplasmic reticulum (ER) liberated through intracellular Ca release channels. The ryanodine receptor (RyR2) is a major Ca release channel in the brain and the heart, and is activated by cytosolic Ca resulting in a regenerative process of Ca-induced Ca release (CICR), which enables interactions between these pathways. Dysfunction of RyR2 function has been suggested to contribute to impairments in learning and memory, although the details are poorly understood. In addition, the enzyme CaMKII has been implicated in the pathogenesis of memory loss. Inherited mutations in the RyR2 gene have been associated with cardiac arrhythmias and sudden death, but some a few patients were also shown to develop mental retardation. Therefore, we hypothesized that a gain-of-function defect in RyR2 may lead to cognitive dysfunction. We have recently generated mice with a constitutively activated CaMKII phosphorylation site of RyR2 (S2814D). RyR2 channels with mutation S2814D exhibit an increased open probability, which is associated with enhanced intracellular calcium leak in a cellular environment. A comprehensive behavioral analysis of homozygous S2814D mice and their wildtype littermates was conducted to determine their activity levels, contextual conditioned fear, memory and sensory functions. Our studies revealed no significant differences between S2814D and wildtype mice. In the near future, similar studies will be performed in a mouse carrying a human RyR2 mutation identified in patients with MR. These studies may provide the first insights into the potential link between calcium dysregulation and mental retardation.

Publications: There are currently no published papers (yet) about this work.

31/06 - "The use of a biological marker, 5-HT2C genotype, as a predictor of motivation, adherence and weight loss in participants of an obesity intervention programme"

Instituição/*Institution*: Biomedical Research Centre and Centre for Sport and Exercise Science, Faculty of Health and Wellbeing, Sheffield - UK

Duração prevista/*Estimated duration*: 2007/04 - 2010/04

Investigadores/*Researchers*: Dr. Caroline Dalton, Dr. Jeff Breckon, Dr. Robert Copeland, Dr. Brian Hall, Prof. Gavin Reynolds

Objectives: To determine whether polymorphisms in serotonin or dopamine receptor genes influence changes in body mass index (BMI) or waist/hip ratio in participants of a diet and exercise programme, the extent of motivation of the participants in relation to exercise, and the participants eating behaviour scores.

Methods: 100 obese participants of a 12-week exercise and diet intervention programme took part in the study. BMI and waist/hip ratio data were collected. The Three-factor Eating Questionnaire (TFEQ) was used to quantify eating behaviours, and the BREQ-2 questionnaire to quantify motivation in relation to exercise. Measures and questionnaires were repeated at the end of the programme. DNA was extracted from a buccal swab and genotyped for polymorphisms in serotonin and dopamine receptor genes.

Results: The results indicate that polymorphisms in serotonin receptor genes influence BMI and waist/hip ratio changes in the participants. Subjects with favourable combinations of serotonin receptor genotypes were more likely to reduce their BMI waist/hip ratio than subjects with the opposing genotypes.
In addition dopamine receptor genotype influences the motivation of the participants to engage in exercise. Subjects with unfavourable genotypes were less likely to have improved their motivation score measured by the BREQ-2 questionnaire by the end of the study than those participants with a favourable genotype.
Finally, both serotonin and dopamine receptor genotypes influence the subjects' eating behaviour. Subjects with combinations of unfavourable genotypes were more likely to have eating behaviours known to be associated with weight gain compared to subjects with more favourable genotype combinations.

Conclusions: These findings suggest that success when attempting to lose weight is influenced by polymorphisms in serotonin and dopamine receptor genes. This influence is mediated by the effect of these genes on eating behaviours and on motivation to participate in exercise. Further studies are required to investigate ways of personalising diet and exercise programmes to take into account the influence of these genetic factors.

Keywords: Genotype obesity motivation TFEQ BREQ-2

32/06 - "A review and analysis of conceptual frameworks in accounts of animal psi" – only abstract available

Instituição/*Institution*: Liverpool Hope University, Liverpool - UK
Duração prevista/*Estimated duration*: 2007/09 - 2009/10
Investigadores/*Researchers*: Dr. Diane Dutton, Dr. Carl Williams

Abstract: The objectives of the project were to undertake a critical review of theoretical and empirical accounts of animal psi (ANPSI) research, and to provide a conceptual metaphor analysis of academic and lay accounts of animal psi. The literature review highlighted the central importance of the human-animal relationship in animal psi research. This relationship structures both theoretical and methodological issues, including assumptions about the 'normal' perceptual and cognitive abilities of other species, the impact of the human-animal relationship on experimenter psi and the evidential value of spontaneous cases of psi. The evidence suggests that animal psi may function as an expression of relationship or 'resonance' between individuals, and indicates the necessity for embracing more relational models of psi, that can more readily incorporate its potentially inter-subjective nature. The conceptual metaphor analysis identified a number of assumptions, orienting and generative metaphors. The analysis revealed an expressed preference within academic accounts for evidence-oriented research emphasising the natural behaviour of animals, and the constraints upon this behaviour, which structure the search for ever more exact measurement of psi. In contrast to the more modern experimental parapsychological studies, older and lay theoretical accounts rely on quasi-spiritual concepts to account for ostensible ANPSI and frame these behaviours in a much more complex way. By contrasting these two sets of conceptual models, their underlying theoretical and philosophical assumptions become clearer, highlighting their epistemological context and the role of debate and rhetoric in their construction.

Publications:

Dutton, D. & Williams, C. (in press). Clever beasts and faithful pets: A critical review of animal psi research. *Journal of Parapsychology.*
Williams, C. & Dutton, D. (under review). What the animals have to say: Conceptual frameworks, commonalities and tensions in professional Animal Psi research and lay animal psychic communication. *Journal of the Society for Psychical Research.*

Keywords: animal psi, relationship, conceptual models

36/06 - "The psychophysiology of neurological abnormalities in first episode psychosis and in healthy individuals - A study using multimodal brain imaging" - only abstract available

Instituição/*Institution*: Division of Psychological Medicine, Institute of Psychiatry, London - UK

Duração prevista/*Estimated duration*: 2007/03 - 2010/03

Investigadores/*Researchers*: Dr. Paola Dazzan, Prof. Philip McGuire, Dr. Carmine Pariante, Dr. Marta Di Forti, Dr. Julia Lappin, Dr. Valeria Mondelli

Objectives: This project investigated the anatomical and functional correlates of one of the few objective clinical correlate of psychosis, neurological abnormalities. These are abnormalities of sensory and motor function found in excess in patients with psychosis, and, to a lesser extent, in the general population. These neurological abnormalities may represent a specific clinical sign of the perturbed cortical-subcortical connectivity that putatively underlies psychotic disorders.

Methods: In a sample of patients at the first-episode of psychosis and in healthy controls we evaluated neurological function in four functional areas: 1) “Primary neurological dysfunction” (dysfunction that can be identified by a standard neurological examination); 2) “Sensory integration dysfunction” (dysfunction in the integration of sensory information); 3) “Motor coordination dysfunction” (motor incoordination); 4) “Motor sequencing dysfunction” (performance of complex motor sequences). We also used: structural Magnetic Resonance Imaging (sMRI) to estimate volumes of grey and white matter, and cerebro-spinal fluid (CSF); Diffusion Tensor Imaging (DTI) and DTI Tractography to estimate white matter integrity of Corpus Callosum, Uncinate Fasciculus, Inferior Fronto-occipital Fasciculus, Inferior Longitudinal Fasciculus; functional Magnetic Resonance Imaging (fMRI) for brain activation during an Audio-visual integration task and a Motor movement task.

Results: A total of 54 patients and 46 healthy individuals were recruited in the study. Patients showed significantly higher scores than healthy individuals in all areas of neurological performance ($p<0.05$), with the exception of motor coordination. Global volumes of grey and white matter, and CSF were not correlated with performance on any neurological subscale. In contrast, a worse performance in Primary signs was consistently associated with disruption of white matter integrity of the Corpus Callosum ($p=0.05$), Uncinate fasciculus ($p=0.059$), Inferior Fronto-Occipital fasciculus ($p=0.049$), and Inferior Longitudinal fasciculus ($p=0.01$).

Conclusions: Neurological signs in psychoses are likely to reflect the alteration in connectivity that has been suggested to be one of the key pathophysiological processes occurring in these disorders. In the next step, the analysis will focus on the functional data, to evaluate whether the areas connected by these tracts are also impaired in function.

Keywords: Neurological signs, Schizophrenia, Psychosis, MRI, DTI.

44/06 - "Brain Electric Activity in Meditation: Extension of Earlier Work and Hypothesis Testing"

Instituição/*Institution*: The KEY Institute for Brain-Mind Research, University Hospital of Psychiatry, Zurich - Switzerland

Duração prevista/*Estimated duration*: 2007/10 - 2010/04

Investigadores/*Researchers*: Prof. Dietrich Lehmann, Mr. Shisei Tei, Dr. Pascal Faber, Prof. Hiraoki Kumano, Dr. Lorena Gianotti, Dr. Roberto Pascual-Marqui

Objectives: A major objective of our Bial grant concerned the exploration of conceivable commonalities and differences of brain electric states in different traditions of meditation.

Methods: Pursuing this goal, brain electric functional connectivity was studied in experienced meditators of five traditions (13 Tibetan Buddhists, 15 QiGong, 14 Sahaja Yoga, 14 Ananda Marga Yoga, 15 Soto Zen) during tradition-specific meditation (self-dissolution, QiGong, Samadhi, Satori) and during wakeful resting before ('rest1') and after ('rest2') meditation. EEG (19-56 electrodes) was computed (via sLORETA, current density in 6239 voxels) into intracerebral waveshapes of 19 intracerebral regions (ROIs) that correspond to cortex underlying the 10/20 electrode positions. Functional connectivity was computed from scalp-recorded data as conventional coherence between 19 locations, and from sLORETA waveshapes as 'lagged coherence' between 19 ROI's**[**1]; lagged coherence only measures connections with time delay; these are interpretable as true functional connectivity. - For each meditator group, t-tests identified significant coherence differences between rest1 vs meditation and rest2 vs meditation in each of 8 EEG frequency bands (delta to gamma). There are 171 connections between 19 locations or ROIs. For each subject and frequency band, we counted the percentage of connections that reached significantly different coherence between rest1 vs meditation and rest2 vs meditation; from these two %values, mean% was computed, and averaged across all 8 bands, separately for each tradition.

Results: In the 5 traditions, for scalp coherences, 1% to 4% of the connections were significant higher in meditation than rest, 6% to 36% lower; for intracerebral lagged coherence, 0% were higher, between 26% to 68% were lower. On average across the 5 traditions, scalp coherence decreased most strongly in alpha1&2 and beta1&2, while intracerebral lagged coherence decreased most strongly in delta, theta, beta1&2. For the gamma frequency band alone, scalp coherences were higher between 1% to 13%, lower between 1% to 27%; intracerebral lagged coherences were higher in 0%, lower between 2% to 75% of cases.

Conclusions: In sum, all 5 traditions clearly showed more significant decreases than increases in scalp coherence, and only significant decreases, but no increases in intracerebral lagged coherence that avoids distorting volume conduction. Contrary to published reports of strongly increased gamma band coherence in meditation[2], our 5 traditions on average in scalp coherence increased significantly only 4% of the gamma band coherences while 9% decreased; intracerebral lagged coherence showed no increase at all, but decrease in 44% of the coherences.

Publications: [1]http://www.unizh.ch/keyinst/NewLORETA/LORETA01.htm. - [2] Lutz, A., Slagter, H.A., Dunne, J.D. & Davidson, R.J. (2008). Attention regulation and monitoring in meditation. Trends Cogn. Sci., 12(4): 163-169.

Keywords: meditation traditions, EEG, lagged coherence, sLORETA, functional connectivity.

49/06 - "Exploring extrasensory perception under hypnosis stimulation: Personality, imagery, creativity dimension using emotional/neutral targets and relax-tension/hypnosis condition"

Instituição/*Institution*: Instituto de Psicologia Paranormal, Buenos Aires - Argentina
Duração/*Duration*: 2007/02 - 2009/01
Investigadores/*Researchers*: Dr. Alejandro Enrique Parra, Dr. Juan Carlos Argibay, Dr. Sérgio Matteucci

Objectives: The search for 'psi-conducive' states of consciousness has a long history in parapsychology. Reviews of the literature show that there is much evidence to support the contention that hypnosis is a psi-conducive state. States of consciousness, induced through different techniques, have been studied, e.g. hypnosis and progressive muscle relaxation and the induction technique. Subjects who are in a relaxed, psi-conducive state are in a state of low arousal which may be accompanied by such a low motivation that they do not care about performing the psi task well.

Method: In this research project, the participants –believers in the general possibility of psi– were recruited in the Instituto de Psicología Paranormal at Buenos Aires. Subjects were divided into two groups, hypnosis and no-hypnosis stimulation. Subjects all completed three personality questionnaires, such as the *NEO-PI-R*, *Millon Index of Personality Styles Revised, The Myers-Briggs Type Indicator*, two imagery and creativity questionnaires (e.g. *Betts's Vividness of Imagery Scale*) before any psi testing be conducted. Both researchers remain blind to the scores from the personality scales until the subjects had been tested and their test scores be checked and independently rechecked.

Results: The sample included 62 participants, both 40 females (71.4%) and 22 males (28.6%), their ages ranged from 19 to 77 years (Mean= 48.47; SD= 11.02). All subjects also completed the hypnosis susceptibility questionnaire. ESP tests (clairvoyance) was performed which it is being conducted under two counterbalanced conditions: (a) hypnosis and (b) relaxation stimulation. Two targets type (emotional vs. neutral) is being used as stimulus. Emotional targets were previously evaluated by all of the participants, which they will be given ratings for enjoyability, affinity, emotionality, and valence. Each subject, having completed the personality scales will outline the nature of the task to the subject and answer any questions about the procedure. Under hypnosis condition scored psi-hitting 31.2%. notably above chance expected; however. under no-hypnosis ("control") condition we obtained 24.6%, up to date. These are interesting results which seems to suggest that hypnosis condition somehow optimizes psi-communication.

Publications:

[con Juan Carlos Argibay] (2007). Interrelación entre disociación, absorción y propensidad a la fantasía con experiencia alucinatorias en poblaciones no-psicóticas. *Persona, 10*, 213-231

Keywords: Extrasensory Perception – Hypnosis – Personality – Imagery – Creativity

51/06 - "Hallucination Experience and PSI: A psychological, psychopathological, psychophysiological and transcultural approach"

Instituição/*Institution*: Universidad Abierta Interamericana, Facultad de Psicologia, Buenos Aires - Argentina

Duração/*Duration*: 2007/02 - 2009/01

Investigadores/*Researchers*: Dr. Alejandro Enrique Parra, Dr. Luis Santiago Espinoza Paul

Objectives: The purpose of the present study is to test whether hallucinatory experiences respond to the dimensionality principle and whether they occur in non-psychotic disorders. Hence, we will try to detect potential differences (if they were so) between a group of "hallucinators" and a group of "non-hallucinators" with regard to personality, parapsychological and psychopathological traits; hallucinating patients will be compared with nonhallucinating people (undergraduate students); and Peruvian undergraduates students will be compared with and Argentine students in order to carry out a transcultural approach.

Method: A total of 648 undergraduate psychology students population included 494 (76%) females and 154 (24%) males, ranging in age from 17 to 57 years (Mean= 25.11; SD= 7.23). We will test whether vivid imagery, dissociation, schizotypical personality, neuroticism, introversion–extroversion, fantasy-prone, absorption and paranormal experiences are predisposing factors for hallucinatory experience. The sample completed a number of questionnaires, in order to explore experiences such as ESP dreams, telepathy, perception of lights/energies, 'out-of-body' and near death experiences, past lives recall, sense of presence, medium/possession experiences, spontaneous psychokinesis, healing experience, *deja-vu,* mystical experience, apparitional experience.

Preliminary results: The results showed a higher level of cognitive-perceptual, schizotypy, absorption, dissociation, fantasy and hallucination proneness, and visual imagery in OBErs than in non-OBErs and confirm previous studies. The findings suggest that especially cognitive-perceptual aspects of schizotypy, such as disturbances in sense of self, certainly of self, and self-awareness, are essential features of persons who had paranormal experiencers. The results of this study suggest that the dissociational model of the paranormal experiences, which assumed that underlying dissociative proceses such as absorption and fantasy proneness are associated with them.

Publications

¿Son las experiencias paranormales indicadoras de sintomas de esquizotipia?: Una comparación entre dos muestras. *Acta Psiquiátrica* (aceptado para publicación).

¿Son los creyentes en lo paranormal propensos a la experiencia alucinatoria?: Examinando la intensidad de la imaginería y la propensidad a la esquizotipia *Revista Interamericana de Psicologia* (aceptado para publicación).

[con Luis Espinoza Paul] Comparación entre la esquizotipia positiva y negativa con la intensidad de la espiritualidad y las experiencias paranormales en población no-clinica. *Revista Argentina de Clinica Psicologica* (aceptado para publicación).

Experiencias extrasensoriales y experiencias alucinatorias: Influencia de variables perceptuales y personalidad. *Ciencia Psicológica* (aceptado para publicación).

¿Son los creyentes en lo paranormal propensos a la experiencia alucinatoria?: Examinando la intensidad de la imaginería y la propensidad a la esquizotipia. *Revista Uruguaya de Psicología* (aceptado para publicación).

(2009). Experiencias alucinatorias nocturnas: Relación con la esquizotipia, tendencias disociativas y propensidad a la fantasía. *Revista Internacional de Psicología, 43*,(1), pp. 134-143.

(2008a). Medidas psicológicas en relación con experiencias alucinatorias y experiencias aparicionales. *Persona, 11,* 109-128.

(2008b). La "visión del aura" como experiencia alucinatoria en individuos no-clínicos. *Revista Psico-USF, 13*(2), 277-286.

(2008c). Efectos de las experiencias espirituales/paranormales en la vida de las personas y su bienestar psicológico. *Revista Argentina de Clínica Psicológica, 17, 233-242.*

(2008d). Las experiencias extracorpóreas y las experiencias alucinatorias: Relación con variables cognitivas y perceptuales. *Revista Liberabit, 14,* 5-14.

(2008e). Alucinaciones "negativas": ¿Falla en la percepción o disociación amnésica? *Actualidad Psicológica, 33*(366), 29-31.

(2008f). Esperienze fuori del corpo ed esperienze allucinatorie: Un approccio psicologico. *Quaderni di Parapsicologia, 39,* 9, 32-51.

(2007a). La experiencia alucinatoria: El continuo de experiencias en individuos normales y psicóticos. *Acta Psiquiátrica y Psicológica de América Latina, 53*(4), pp. 244-256.

(2007b). ¿Es la alucinación una experiencia normal?: Una evaluación dimensional de la experiencia alucinatoria en individuos no-psicóticos. *Actualidad Psicológica, 32*(359), 20-24.

(2007c). Interrelación entre disociación, absorción y propensidad a la fantasía con experiencias alucinatorias en población no-clínica. *Alcmeón: Revista Argentina de Clínica Neuropsiquiátrica*, 16(1), 61-71.

(2006). "Seeing and feeling ghosts": Absorption, fantasy proneness, and healthy schizotypy as predictors of crisis apparition experiences. *Journal of Parapsychology, 70*, pp. 357-372.

Keywords: Hallucination experience **–** Cognitive-perceptual schizotypy – Absorption – Dissociation – Fantasy prone

54/06 - "Heterogeneity in high hypnotic suggestibility and its implications for the study of anomalous experiences"

Instituição/*Institution*: Department of Psychology, Lund University, Lund - Sweden
Duração prevista/*Estimated duration*: 2007/09 - 2010/01
Investigadores/*Researchers*: Dr. Devin Blair Terhune, Prof. Etzel Cardeña

Abstract: Highly suggestible individuals exhibit considerable heterogeneity. A number of models have proposed that there is a dissociative highly suggestible subtype. This project tested predictions of these models and examined whether different highly suggestible subtypes display different patterns of anomalous perceptual experiences.

The first study investigated whether there are discrete subtypes of highly suggestible participants with a latent profile analysis of spontaneous phenomenological responses during hypnosis. The analysis suggested two subtypes, an inward-attention and a dissociative subtype. The former experienced greater alterations in awareness and volition, whereas the latter experienced greater attention and more vivid imagery.

The second study examined whether the two subtypes differ in hypnotic responding and cognitive functioning. High dissociative highly suggestible (HDHS) participants were more responsive to positive and negative hallucination suggestions and experienced greater involuntariness during hypnotic responding than low dissociative highly suggestible (LDHS) participants. HDHS participants exhibited impaired working memory capacity, whereas LDHS participants displayed superior object visual imagery. The two subtypes didn't differ in general psychopathology, but HDHS participants exhibited greater levels of pathological fantasizing.

The third study tested the prediction that a hypnotic induction would differentially impact executive attention in the different HS subtypes types. HDHS participants exhibited impaired cognitive control during hypnosis relative to the control condition, whereas low suggestible (LS) and LDHS participants displayed marginally superior cognitive control during hypnosis.

The fourth study examined the neural basis for differential levels of state dissociation among LDHS and HDHS participants. HDHS participants exhibited marginally greater state dissociation during hypnosis than the other two groups. We also evaluated the relationship between this finding and measures of electrocortical synchronization.

The fifth study examined whether the typological models can yield insights into the expression and prevalence of anomalous perceptual experiences. The HDHS participants were found to consistently report a greater incidence of anomalous experiences.

These studies indicate that there are different subtypes of highly suggestible individuals who exhibit dissimilar cognitive and phenomenological profiles.

Keywords: hypnotic suggestibility, hypnosis, dissociation, executive function, anomalous experiences

57/06 - "The diurnal pattern of cortisol secretion in relation to season in healthy participants and those with seasonal affective disorder (SAD)"

Instituição/*Institution*: Psychophysiology and Stress Research Group, Dep. of Psychology and Human and Health Sciences, University of Westminster, London - UK

Duração/*Duration*: 2007/02 - 2009/05

Investigadores/*Researchers*: Prof. Angela Clow, Prof. Phil Evans, Prof. Frank Hucklebridge, Dr. Lisa Thorn

Objectives: This study compared the daily pattern of free salivary cortisol secretion in winter and in summer between two groups; participants with seasonal affective disorder (SAD) and age- and sex-matched healthy controls. The aim was to enhance theoretical understanding of the regulation of cortisol secretion over the day and contribute to the understanding of the pathophysiology and treatment of SAD.

Methods: Fifty-two participants completed the study with an equal number in each group. The diurnal pattern of cortisol secretion was assessed across two consecutive days in summer, and two in winter, with conditions being counterbalanced. On each study day participants collected multiple saliva samples in the domestic setting to capture the cortisol awakening response (CAR) and declining levels across the day. In addition, perceived stress, anxiety, depression, state stress and state arousal were assessed using validated questionnaires.

Results: In summer, SAD and control participants had similar psychological and cortisol profiles. In winter however, SAD participants reported greater depression, stress and anxiety, and lower levels of arousal (i.e. more drowsy, tired and sluggish, less alert, active, energetic and stimulated) following awakening in the morning. Furthermore, the CAR was significantly attenuated in SAD participants during winter months. There was no difference in cortisol levels during the rest of the day between controls and SAD participants in winter. In line with the above findings and previous research there was a negative relationship between the increase in cortisol following awakening and a measure of seasonality in winter. Participants who reported greater propensity for seasonal changes in mood exhibited an attenuated CAR in winter.

Conclusions: In winter, when light levels are low the cortisol response to awakening is attenuated in participants with seasonal affective disorder in comparison to controls. This study provides a new understanding of the physiology of clinical condition and will inform treatment.

Keywords: Seasonal affective disorder, cortisol, cortisol awakening response, seasonal differences

59/06 - "Probing the human mirror neuron system using EEG: action observation, error monitoring and empathy" – only abstract available

Instituição/*Institution*: Centre for Research in Cognition, Emotion and Interaction, School of Human and Life Sciences, Roehampton University, London - UK

Duração prevista/*Estimated duration*: 2007/04 - 2010/03

Investigadores/*Researchers*: Dr. Joseph Patrick Levy e Dr. Armanda H. R. Holmes, Dr. Lance Slade, Dr. Jonathan Silas, Dr. Maria Nielson

Objectives: We aim to examine the individual and sex differences in EEG correlates of action observation and error monitoring and to investigate whether our measures are congruent to what has been suggested by some to be a human "mirror neuron system".
Our measures are mu desynchronisation and the readiness potentials (RPs) during action execution and observation, and the error-related negativity (ERN) triggered by the execution and observation of errors.

Method: Expt 1: We tested 48 participants using an experimental paradigm where the participant both performed simple button press actions and observed the experimenter make such actions. Participants also completed established social cognition scales (EQ, SQ, IRI).
Expt 2: We tested 43 participants performing a demanding Go/No-Go task and observing the experimenter performing the task. Participants also completed empathy-related scales as above.

Results: In Expt 1, we found sex differences for both mu desynchronisation and RPs. However, the sex differences were in opposing directions with a female superiority for the induced mu measure and a male superiority for the evoked RP measure. Furthermore, neither measure correlated with social cognition scales and the measures did not correlate with each other.
Preliminary analysis of Expt 2 indicates that the magnitude and time course of the ERN to self-performed errors in equivalent for males and females. The ERN for observed errors appears to emerge later than that to performed errors and to be enhanced in females compared with males.

Conclusions: Our report for Expt 1 has been accepted for publication and concludes that EEG measures of simple motoric mirroring can reveal both male and female superiorities and that these measures need not correlate with measures of social cognition. We speculate that our results may be indicative of two dissociable motoric mirroring systems. Our analysis of Expt 2 indicates that we have replicated work in the literature that suggests a mirror system for response monitoring and have measured a sex difference for it.

Keywords: mirror neurons, EEG, action observation

References: Silas, J., Levy, J. P., Nielsen, M., Slade, L. & Holmes, A. (in press). Sex and individual differences in induced and evoked EEG measures of action observation, *Neuropsychologia*.

61/06 - "Neural Mechanisms of Temporal Discounting"
Instituição/*Institution*: Harvard Medical School, Dep. of Neurobiology, Boston - USA
Duração/*Duration*: 2007/02 - 2009/10
Investigadores/*Researchers*: Prof. Margaret Livingstone, Prof. Nancy Kanwisher, Dr. Johannes Haushofer, Dr. Camilo Libedinsky

Objectives: Temporal discounting refers to the decrease in subjective value as a result of delay of reward. Previous studies have focused on neural correlates of intertemporal choice, e.g. decisions between $10 today and $11 tomorrow. This approach makes it difficult to isolate neural correlates of individual delayed rewards, and to dissociate neural correlates of valuation from decision processes. The present study attempts to identify the neural correlates of temporal discounting per se, as distinct from intertemporal choices.

Methods: Subjects were presented with *single* rewards of varying magnitude and delay, allowing us to identify neural correlates of temporally discounted value without confounds from decision processes. In addition, we could dissociate representations of valence vs. arousal due to the inclusion of both positive and negative payoffs.

Results: We find that delay of reward is reflected in the caudate nucleus and nucleus accumbens, where activation increases going from long to short delays for gains, and decreases from long to short delays for losses. In addition, the steepness of the neural discount function in caudate nucleus correlated with individual discount parameters obtained in a separate testing session. Conversely, reward *magnitude* is most strongly reflected in nucleus accumbens, where activation increases from small to large gains and from large to small losses.

Conclusions: Together, our results demonstrate that caudate nucleus represents temporally discounted value, independently of decision processes and arousal, and in a manner that reflects subjective time preferences. More generally, our study shows that limbic regions can encode abstract features of a reward, such as delay.

Publications: Haushofer J, Klein M, Livingstone MS, Kanwisher N (in preparation). Neural Substrates of Temporal Discounting.

Keywords: temporal discounting, reward, neuroeconomics, fMRI

62/06 - "The Pilgrimage Project: A study of motivations and experiences in sacred spaces"

Instituição/*Institution*: Ian Ramsey Centre, University of Oxford - UK
Duração/*Duration*: 2007/03 - 2010/02
Investigadores/*Researchers*: Dr. Miguel H. Farias, Dr. Alana Harris, Prof. Christina Aus der Au, Dr. Katja Wiech, Dr. Pedro Soares, Dr. Wiebke Friese

Abstract: The aim of this project was to understand the interaction between motivations to go on pilgrimage, religious behaviours and experiences, and psychological outcomes. We were also interested in looking at sacred spaces and individuals affiliated with contrasting types of religiosity.
Various European sites were selected according to their representativeness of traditional Christianity and Paganism. Four hundred and fifty pilgrims to the Roman Catholic sites of Fátima, Lourdes, the Pagan site of Stonehenge, and the New Age town of Glastonbury were asked to fill in a questionnaire. This included standardized measures of positive and negative affect (PANAS), personality (EPQ), magical/paranormal ideation, as well as measures of religious belief/experience and activities, a newly developed scale on motivations to pilgrimage, and a qualitative section. Longitudinal data was collected using a reduced version of the questionnaire 8 to 12 weeks after the respective pilgrimage.
Spiritual Growth and Community/Care were the major motivational dimensions for pilgrims at both Christian sites, while Pagan pilgrims scored highest on Cosmic/Nature Closeness and Sensation Seeking motivations. Results for Positive and Negative Affect showed that Christian pilgrims were significantly higher on positive affect than Pagan pilgrims, while Pagan pilgrims scored significantly higher on negative affect. Items asking about physical illness and mental health problems presented no significant differences between groups, so these differences in affect may be attributed to the characteristics of the pilgrimage (e.g. the ritual activities) and the motivations to be a pilgrim, instead of base individual differences. Pagan pilgrims also had significantly higher scores on magical/paranormal ideation and spiritual experiences.
These results are approached within a broad framework highlighting the behavioural and social-cognitive differences between Pagan and Christian belief systems. Specifically, we suggest that Pagan rituals elicit higher arousal than Christian ones, and are less supported by a social and belief structure. This makes Pagan pilgrims more likely to experience negative affect (e.g. fear) and a higher frequency of unusual experiences. Historical evidence from Classical Paganism is drawn upon to support these conclusions.
Some of these results have been presented at two international conferences. Four papers are about to be submitted to various journals and a monograph proposal is under preparation.

Keywords: Pilgrimage, Motivation, Spiritual Experience, Affect, Personality

64/06 - "Brain Imaging Study of the Psychological Antecedents and Neural Correlates of Moral Judgement" - only abstract available

Instituição/*Institution*: Ian Ramsey Centre, University of Oxford - UK
Duração/*Duration*: 2007/02 - 2008/12
Investigadores/*Researchers*: Dr. Nicholas Shackel, Dr. Katja Wiech, Dr. Guy Kahane, Dr. Miguel Farias

Objectives: Previous neuroimaging studies of moral dilemmas have suggested that different modes of moral deliberation have distinct neurobiological correlates: deontological, rule-based judgments have been associated with automatic, affect-laden moral intuitions; and utilitarian, utility-maximizing judgments with controlled cognitive processing. However, the respective contribution of content (deontological or utilitarian) and intuitiveness to moral judgement is still unclear, and the neural bases of moral intuitions remain obscure.

Methods: Using functional magnetic resonance imaging (fMRI) in healthy volunteers, we investigated the neural bases of counterintuitive moral judgements, while controlling for the content of these judgments (utilitarian versus non-utilitarian). More specifically, we investigated the relationship between the effort required to arrive at a moral judgement, as reflected by behavioural and neural responses during moral decision-making, and two personality traits, each potentially reflecting one of the two postulated pathways to counterintuitive moral judgment (cognitive effort or emotional deficit).

Results: Counterintuitive judgements were perceived as more difficult than intuitive judgements, whereas there was no significant difference in perceived difficulty between utilitarian and deontological judgments. At the neural level, the fMRI data suggest that previously reported differences in moral judgment are in fact largely due to their intuitiveness and not to their content. Furthermore, we show that the difficulty of making counterintuitive moral judgments is reflected in activation in the rostral anterior cingulate cortex (rACC). Importantly, rACC activation during counterintuitive judgments of a specifically utilitarian character was negatively correlated with 'psychoticism', a trait associated with diminished affect and social awareness, but not with 'need for cognition', a trait reflecting preference for complex cognition.

Conclusions: Our data thus suggest that recent attempts to draw support for utilitarian ethics on the basis of research on the neuroscience of moral cognition are premature. More importantly, our findings provide evidence that counterintuitive moral judgment in healthy individuals can be based in two distinct neural mechanisms, and that the rACC is a key structure in moral cognition which can serve as a biomarker for these two pathways to moral judgment.

Keywords: Neuroimaging, moral judgment, decision-making, cognition, emotion

65/06 - "Exploring the Relationship of Out-of-Body Experiences and Hallucinations: The Role of Depersonalization Experiences" – only abstract available
Instituição/*Institution*: Parapsychology Foundation Satellite Office, Virginia - USA
Duração/*Duration*: 2007/03 - 2009/05
Investigadores/*Researchers*: Prof. Carlos S. Alvarado, Dr. Nancy Zingrone

Objectives: Out-of-body experiences (OBEs) have been explored in terms of their relationship to absorption, body image, dissociation, dreams, fantasy proneness, imagery, schizotypy, openness to experience, parapsychological experiences, and alterations of consciousness. Because literature reviews have also suggested a relationship between OBEs and depersonalization, our objective was to explore this further.

Methods: We conducted a random postal survey (S1) and an open web-based survey (S2). Respondents completed the Cambridge Depersonalisation Scale (CDS), the Satisfaction With Life Scale (SWLS) and demographic, medical, dream, synesthesia-like and parapsychological (psi) experience items. Some also completed the Launay Slade Hallucination Scale (LSHS) and/or an OBE phenomenology instrument that resulted in an OBE Feature Index (OFI) and an OBE Transformation Score (OTS). Compared both within and between studies overall, for OBErs vs non-OBErs, and for low vs high CDS scorers: psychological scale scores; specific CDS item scores; OFI and OTS; presence/absence and frequency of medical, dream, mystical, synesthesia-like, and psi experiences.

Results: In S1 256 persons responded, 63% female and 38% male (Age R=17-95, M=49.3, SD=18.7). In S2 589 persons responded, 65% female and 35% male (Age R=13-84, M=45.3, SD=14.2). CDS Scores in S1 and S2 were significantly and positively correlated to all psi, mystical and déjà vu experiences, LSHS scores, lucid and disturbing dreams. CDS scores correlated significantly but negatively to SWLS scores in S1 (rs=-.59). In S1 and S2 positive significant relationships were found between CDS scores and OBEs. In S1 (N=11), high and low CDS scorers did not differ on the OFI or on specific OBE features, while in S2 (N=61) the feature “looking down while out of the body” was significantly different. In S1 and S2 we found significant positive relationships between OBEs and synesthesia, headaches and head injury. In S1 and S2, OBE frequency correlated significantly and positively with psi experiences, dreams, déjà vu, and mysticism. In S2, OBE frequency also correlated positively with LSHS scores. Claims and frequency of all experiences, CDS and LSHS scores, and the OTS were significantly higher for respondents in S2 than in S1. Results of both our studies replicated comparable previous findings.

Publications:

1. Alvarado, C.S., Zingrone, N.L., & Agee, N. (in preparation). *Feelings of Being Out of the Body: Relationships with Depersonalization Experiences.*

2. Alvarado, C.S., Zingrone, N.L., & Agee, N. (2009). *Experiencias parapsicológicas y de despersonalización: Una encuesta con una muestra Norteamericana de la comunidad.* Paper presented at the 5th Psi Encounter in Recife, Brazil. September.

3. Zingrone, N.L., Alvarado, C.S., & Agee, N. (in preparation). *Depersonalization-Like Experiences: A Survey with Participants from the General Population.*

4. Zingrone, N.L., Alvarado, C.S. & Agee, N (2009). Psychological correlates of aura vision: Psychic experiences, dissociation, absorption, and synaesthesia-like experiences. *Australian Journal of Clinical and Experimental Hypnosis, 37*(2), 57-94.

Keywords: Out-of-body experiences, Depersonalization, Hallucinations

72/06 - "Required time for cognitive and motor activities in lucid dreams"

Instituição/*Institution*: University of Heidelberg, Institute for Sport and Sports Science, Heidelberg - Germany
Duração/*Duration*: 2007/01 - 2009/01
Investigadores/*Researchers*: Dr. Daniel Erlacher, Dr. Michael Schredl, Dr. Carmen Gebhart

Objectives: The relationship between time in dreams and real time has intrigued scientists for centuries (cf. Schredl, 2000). In a recent study by Erlacher and Schredl (2004) it was shown that the required time to perform a motor task in a lucid dream was significant longer than the required time for the same task in the waking state. In contrast, the time intervals for counting were quite similar in lucid dreams and in wakefulness. In this experiment a simple cognitive task was used to investigate the relationship between the time needed in a lucid dream and the time needed for the same activity performed in the waking state.

Methods*:* Two experiments were conducted whereas in experiment 1 the participant's task was to count to 10, 20, and 30 and in experiment 2 to walk 10, 20, and 30 steps in their lucid dreams. The lucid dreamers were instructed to mark the events by LRLR: the onset of lucidity, the beginning of each sequence and the end of the lucid dream task. The LRLR are clearly visible in the EOG recording and the interval between two LRLR can be measured. Sleep was recorded by means of standard procedures (EEG, EOG, EMG) by the standard recording device Trex Longtime EEG recorder (XLTEK).

Results*:* For the first and second experiment the results showed that the absolute duration of counting or walking in the lucid dream takes more time than for counting or walking during wakefulness. The relative timing, however, revealed for both conditions quite similar percentages for the two conditions (lucid dreaming and wakefulness).

Discussion*:* The results showed that in lucid dreams a tendency exists to overestimate durations for simple cognitive and motor tasks, but, that those differences are not visible for the relative timing of the tasks. In general the statistical analysis has to face the problem of testing for equivalence, because the alternative hypothesis predicts a similar result and not a difference (c.f. Wellek, 2003).

Literatur:

Schredl, M. (2000). Body-mind interaction: Dream content and REM sleep physiology. *North American Journal of Psychology, 2*(1), 59-70.

Erlacher, D., & Schredl, M. (2004). Time required for motor activity in lucid dreams. *Perceptual and Motor Skills, 99*, 1239-1242.

Keywords: sleep, lucid dreaming, time, counting, walking.

78/06 - "ERP correlates of relational learning: Testing a behavioural model of word webs" - only abstract available

Instituição/*Institution*: Wales Institute of Cognitive Neuroscience, Dep. of Psychology, University of Wales, Swansea - UK

Duração/*Duration*: 2007/01 - 2009/03

Investigadores/*Researchers*: Dr. Simon Dymond, Prof. Lanny Fields

Abstract: Words may come to acquire their relational/semantic functions on the basis of participation in derived stimulus relations, such as stimulus equivalence, and evoke the N400 ERP. The present series of experiments were designed to examine the behavioural and ERP correlates of stimulus equivalence relations using a novel, stimulus-pairing yes/no procedure. In Experiment 1, 30 right-handed participants were trained using a many-to-one training design to form 2, 4-member relations (A-D, B-D, C-D) consisting entirely of pseudo-words. On every trial, a sample stimulus appeared for 1 s before being replaced by a fixation cross and then a comparison stimulus, which remained on screen until response keys marked 'Yes' or "No' were pressed. Within (i.e., A1-D1-Yes) and between (i.e., A1-D2-No) discriminations were trained to a high accuracy before feedback was faded and symmetry (D-A, D-B, D-C) and equivalence relations (A-B, A-C, B-A, B-C, C-A, C-B) subsequently tested. EEG recording from 32 sites was undertaken during participants' only test exposure. Results indicated 21/32 passed the equivalence test. Grand average ERPs indicated no significant separation during the N400 epoch. In Experiment 2, a two-stage training and testing procedure was adopted, and only participants who passed the first phase progressed to the second. First, 2, 3-member relations were trained and tested using a linear-series design (A-B/B-C). Symmetry (B-A/C-B) was first tested, followed by transitivity (A-C) and equivalence (C-A). If participants passed all tests, they proceeded to a training phase in which expanded relations were trained (C-D). Acquisition of these relations was followed by tests for symmetry (D-C), 1-node transitivity (B-D), 1-node equivalence (D-B), 2-node transitivity (A-D), and 2-node equivalence (D-A). Overall, of 35 participants recruited, 7 failed to proceed beyond the preliminary phases, 4 failed the expanded relations phase and 24 passed. Analyses of the EEG data, however, failed to reveal any significant differences between the trial types. This highlights that the procedure, while effective for establishing arbitrary word webs, was not effective for evoking the N400 ERP. It is argued that the stimulus pairing yes/no procedure explicitly reinforces both between and within class discriminations. That is, participants have a direct history of learning that stimuli go together and which stimuli do not. N400 is typically evoked during violation of semantic expectancy; training participants that some stimuli go together and some do not mitigates the potential violation. In conclusion, the findings, which are currently being written up for publication, indicate that equivalence relations may be formed using the stimulus pairing yes/no procedure but that a separate task may be necessary to measure the ERPs evoked by the arbitrary, pseudo-words.

Key words*:* Relational learning; stimulus equivalence; N400

80/06 - "Understanding the role of dendrites in cortical information processing"
Instituição/*Institution*: Dep. of Psychology, Faculty of Arts and Sciences, University of Rijeka, Rijeka - Croatia
Duração/*Duration*: 2007/02 - 2010/02
Investigadores/*Researchers*: Prof. Drazen Domijan, Prof. Mladenka Tkalcic, Dr. Mia Setic, Prof. Ana Prorokvic, Dr. Pavle Valerjev

Objective: Objective of the proposed project is to develop and test new neural networks for visual perception and cognition, which includes dendrites as independent computational units. It is expected that the neural model with dendrites will exhibit greater capacity for information processing and its output will show greater similarity with human behavior and experience compared to previous models.

Methods: We used computer simulations in order to test the properties of the proposed models. Results of computer simulations are compared with the results obtained in previous brain imaging and behavioral research on humans and/or neurophysiological studies on primates. Also, we tested several predictions derived from the models using cognitive experiments on humans where we measured the speed and accuracy of responses to simple perceptual and cognitive tasks.

Results and Conclusions: Computer simulations showed that new neural networks with dendrites are able to explain how attention influences neural activity in the visual cortex, how visual search is performed, how cortical activity gives rise to figure-ground organization and perception of temporal structure. Furthermore, we developed a neural model of semantic memory which is able to simulate recent experimental findings about interaction between language understanding and perception and action. We performed several cognitive experiments which showed that perceptual and motor variables facilitate semantic processing in agreement with the model. Our project provided computational evidence for the importance of dendrites for information processing in the nervous system and for understanding visual perception and cognition.

Publications:
1. Domijan, D., & Šetić, M. (2009). Adaptive resonance as a neural basis of conceptual semantics. In N.A. Taatgen & H. van Rijn (Eds.), *Proceedings of the 31th Annual Conference of the Cognitive Science Society* (pp. 2196-2201). Austin, TX: Cognitive Science Society.
2. Domijan, D., & Šetić, M. (2008). A feedback model of figure-ground assignment. *Journal of Vision*, *8(7):10*, 1-27, http://journalofvision.org/8/7/10/.
3. Šetić, M., & Domijan, D. (2008). Modeling the top-down influences on the lateral interactions in the visual cortex. *Brain Research*, *1225*, 86-101.
4. Šetić, M., & Domijan, D. (2008). A computational model of saliency map read-out during visual search. In V. Kurkova, R. Neruda, & J., Koutnik (Eds.), *Artificial Neural Networks – ICANN 2008*, (pp. 433-442). Berlin: Springer.

Keywords: attention, computational model, neural networks, semantic memory, visual perception

85/06 - "The occurrence, phenomenology and psychological correlates of Out-Of-Body and Near Death Experiences" – only abstract available
Instituição/*Institution*: Manchester University, Manchester - UK
Duração/*Duration*: 2007/06 - 2009/11
Investigadores/*Researchers*: Dr. Craig Murray, Dr. David J. Wilde

Objectives: To elicit in-depth phenomenological detail regarding the lived experience of having either an OBE arising under a variety of circumstances or an NDE; To expand upon current psychological theories of OBEs/NDEs;

Methods: Fifteen participants took part in face-to-face, semi-structured interviews. The sample comprised of experients with a variety of OBEs (sleep-related (n=3), whilst feeling physically/psychologically threatened (n=3), meditatively achieved (n=3), and whilst under the influence of drugs or alcohol (n=3)) and those who had an NDE (n=3). Data were analysed using Interpretative Phenomenological Analysis (IPA).

Results: Findings from three of the above groups of interviews are presented:
Sleep related OBEs: Participants' OBEs were found to play an adaptive role in response to difficult life events. The process of integration was helped or hindered by the varying reactions from others to the disclosure of the OBE.
Meditative OBEs: Analysis highlighted the potential for the OBE to function as an adaptive psychological response related to participants' efforts to discharge existing need-related conflicts. Also emergent was the transactive nature of the out-of-body environments themselves, which were seen as meaningful places that facilitated participants' embodied, goal-oriented behaviours.
NDEs: Rather than being an overall influence on personal and spiritual growth, participants chose elements of their NDE which were most personally meaningful for them to take into their later lives. Also evident were the challenges the NDE, or elements therein, have on the individual's sense of self and how they maintain and develop that self in the years succeeding the event.

Conclusions: The idiographic nature of this work highlighted the personal, social and environmental mediating factors that influenced how the OBE/NDE was managed and integrated. In addition, concomitant physical and psychological events can also intertwine in vastly complex ways, which may aid or hinder the individual's resolution of the underlying meaning of the event.

Publications:

1. Wilde, D. and Murray, C. D. (2009). The evolving self: finding meaning in near-death experiences using interpretative phenomenological analysis. *Mental Health, Religion and Culture*, 12:3,223-239.
2. Wilde, D. and Murray, C. D. (2009). An interpretative phenomenological analysis of out-of-body experiences in two cases of novice meditators. *Australian Journal of Clinical and Experimental Hypnosis*, 37:2, 90-118.
3. Wilde, D.J. and Murray, C.D. (in press) Interpreting the anomalous: Finding meaning in out-of-body and near-death experiences. *Qualitative Research in Psychology*

4. Murray, C.D., Wilde, D. and Murray, J. (2009). Managing anomalous experience: Meaning making and the OBE. In C.D. Murray (Ed.) *Psychological Scientific Perspectives on Out-of-Body and Near-Death Experiences*, Nova Science Publishers, New York. Pp 105-115.
5. Murray, C.D., Wilde, D. and Murray, J. (2009) Finding meaning in near-death experiences. In C.D. Murray (Ed.) *Psychological Scientific Perspectives on Out-of-Body and Near-Death Experiences*, Nova Science Publishers, New York. Pp 205-219.

Keywords: Out-of-Body Experience, Near-Death Experience, Qualitative Methods, Interpretative Phenomenological Analysis

90/06 - "Advancing methodology in the psychophysiology of stress: capturing the complexity of immunity"

Instituição/*Institution*: Department of Psychology, Anglia Ruskian University, Cambridge - UK

Duração prevista/*Estimated duration*: 2007/07 - 2010/03

Investigadores/*Researchers*: Dr. Matt Bristow, Dr. Rachel Cook

Objectives: Research has demonstrated a clear relationship between acute stress and mucosal immunity but far less research has examined the role of recent or chronic stress in mediating mucosal immune levels. In this study we examine the relationship between the stability of mucosal immunity and stress over the preceding days, weeks and year.

Methods: In study one sixty-nine undergraduates gave passive drool saliva samples six times throughout the day (immediately after waking, 30 and 60 minutes after waking & 7pm, 9pm and before retiring for the day) over four consecutive week days. In study two eighty-nine participants provided saliva samples immediately after waking and at 7pm for up to 10 days. Standardised questionnaires were used to measure participants perceived stress and life events over the preceding days, weeks and year. Saliva samples were analysed for immunoglobulin A concentration (IgA) and total protein levels.

Results: We found little evidence of a relationship between average levels of mucosal immunity and measures of stress but, as hypothesised, we did find evidence of a relationship between measures of stress and the stability of mucosal immunity over time, though the direction of effect in the two studies were not consistent. The IgA/ protein ratio, a potential measure of the degree to which changes in IgA are IgA specific or general changes in protein, was also linked to previous experience of stress.

Conclusion: Measures of mucosal immune stability may provide a useful index of immune functioning that captures more of the complexity of immunity than simply averaging consecutive samples. The IgA/ protein ratio is a measure of mucosal immune function that appears to be inversely linked to previous stressful experience and is a useful measure for future study.

Key words: Immunoglobulin A (IgA), total protein, stress, stability, mucosal immunity

98/06 - "The Meaning-Switch - Investigation of Pre-Cognition in an Operationally Closed System"

Instituição/*Institution*: T.REG Systems Research Labs, Staufen - Germany
Duração/*Duration*: 2007/07 - 2009/07
Investigadores/*Researchers*: Dr. Walter von Lucadou, Dr. Matthias Braeunig, Dr. Tilmann Faul

Objectives: We investigated a Triggered Random Event Generator (T.REG) for excursions from randomness during an intention task experiment and the effect of a so-called Meaning- or M-switch, whereby subjects can partly invert sequences of the output bit stream. We tested for hypotheses on mean and variance of scores, and correlation of gain with trial and participant numbers, indicative of individual and "morphogenetic" learning. Excess correlation between physical and psychological variables as a test for the Model of Pragmatic Information (MPI) was analyzed.

Methods: The T.REG is an electronic device for sampling bits from a binary stream of states, triggered by the subjects physiology. Brain electrical activity is measured at the forehead with one-channel differential EEG. Acoustic feedback is given for cumulative score deviations from theoretical expectation. 22 subjects performed in ten trials of approximately 5 min. duration and generated 3 Mbits each. In the last (tenth) trial the true physical REG was replaced by a similarly triggered but deterministic single-seeded Pseudo-REG (PREG) without people knowing. The instruction was to generate increasing pitch in the feedback tones.

Results: Without any subject the T.REG performs as a good random number generator. In PREG trials a clear mean shift was observed and gain showed positive but non-significant correlation with the participant sequence numbers. Individual learning in non-PREG was negative. M-switch activity, consistent within subjects, revealed five distinct clusters. Psychological variables deduced from M-switch and event timing correlated with physical variables significantly higher, showing 17 instead of 10 expected significant correlations (P=.03).

Conclusions: There is no evidence that operational closure, thus conceived, is capable of enhancing precognitive performance. However, subjects seem to be able to discern between PREG and non-PREG conditions, which should be investigated in a follow-up experiment. A result from a previous study concerning increased variance could not be replicated. The M-switch proves as a promising and simple tool in psycho-physical REG experiments leading to many psychologically interesting results.

Publications:

Braeunig M. and Faul T. (2009), The Meaning-Switch – Investigation of Precognition in an Operationally Closed System, *Bial Summary Report* 98/06
- Zeitschrift für Anomalistik (ZfA) planned for 2010.
- Journal of Scientific Explorations (JSE) planned for 2010.

Keywords: Triggered Random Event Generator, Precognition, Operational Closure, EEG

103/06 - "Psi Related Experiences and Spatialization: the use of geographic information systems to investigate spontaneous Psi Phenomena and experient profiling" – only abstract available

Instituição/*Institution*: Spatial Informatics Research and the Anomalous Experiences Research Unit, Department of Sociology, University of York - UK
Duração/*Duration*: 2008/10 - 2009/12
Investigadores/*Researchers*: Prof. Roger Burrows, Dra. Madeleine Castro

Objectives: This exploratory project used large scale survey data to investigate the contemporary incidence of a range of psi related experiences (PRES) in the UK population. Drawing on existing socio- and geo- demographic data bases, an attempt was made to identify the spatial and geo locational properties of reported PRES, thereby supplementing existing studies of the psychological and sociological correlates of ostensible psi phenomena.

Methods: Questions relating to five forms of paranormal experience (telepathy, precognition, extra sensory perception, contact with the dead, and mystical/transcendent experiences) were included in two face-to-face IPSOS/Mori omnibus surveys conducted in January and February 2009. In total, a weighted, representative sample of 4, 096 adults (16 years+) was collected from 203 sample points in the UK.

Results: 11% of the respondents reported at least one telepathic experience; 24% of the respondents reported at least one experience of precognition; 13% of respondents reported at least one experience of extra sensory perception; 10% of respondents reported at least one experience of after after-death communication; and 12% of respondents reported at least on mystical/transcendent experience. Over a third of all respondents reported one or more of these five experiences. With very few exceptions, there was little evidence of significant correlations between reports of experiences and traditional sociological or geodemographic variables (perhaps the most notable exception being the confirmation of the finding from previous studies that women overwhelmingly report more experiences than men). Spatial analysis showed a statistically significant regional skew towards the south west of England. By contrast, the north of England and London showed a statistically significant low level of reports of these psi related/anomalous phenomena.

Conclusions: It is argued that the relative absence of correlations between reports of experiences and traditional socio demographic and sociological variables suggests that experiences of psi or anomalous phenomena may be structurally under determined compared to other social practices (for example, political beliefs, shopping habits, choice of where to live, and so on.) The finding that the south west of England yields significant level of experience reporting merits further investigation; but it may be that individuals more open to the possibility of anomalous phenomena are drawn to the west country because of the influence of a range of broader cultural and historical factors (traditional Arthurian myths, new age literature that identifies the 'magical' or mystic properties of the south west, the proximity of Stonehenge and Glastonbury, and so on).

Publications

1. Castro. M., Burrows, R., and Wooffitt, R. 'Paranormal experiences in the UK: evidence of structural underdetermination' (in preparation, to be submitted to *Sociology*)
2. Castro. M., Burrows, R., and Wooffitt, R. 'Some socio structural aspects of the incidence of paranormal experiences in the UK' (in preparation, to be submitted to the 53rd Annual Convention of the Parapsychological Association, Paris 2010.

Keywords: Psi-related expriences, survey analysis, spatial analysis.

110/06 - "Paranormal Belief and Well Being: An Exploratory of Cognitive-Perceptual Bias"

Instituição/*Institution*: The Manchester Metropolitan University, Research Institute of Health and Social Change, Manchester - UK

Duração/*Duration*: 2007/02 - 2009/09

Investigadores/*Researchers*: Dr. Neil Andrew Dagnall, Dr. Gary Munley, Dr. Andrew Parker, Dr. Ken Drinkwater

Objectives: The Revised Paranormal Belief Scale (R-PBS) (Tobacyk & Milford, 1983; Tobacyk, 1988) is currently the most widely used measure of paranormal belief. Despite this, the content and structure of the R-PBS has been frequently criticised and the legitimacy of the scale as a satisfactory measure of paranormal belief has been questioned. The current study was conducted with the intention of developing an improved measure of paranormal belief, which addresses the weaknesses of the R-PBS, and includes a wider range of beliefs (i.e., haunting/poltergeist activity and extraterrestrials).

Method: An extensive literature review was conducted: to explore existing measures, identify important facets of paranormal belief, and determine scale content. This produced a 124 item self-report measure containing statements from several existing scales (e.g., R-PBS and Australian Sheep-Goat Scale) and newly constructed items (haunting/poltergeist activity, extraterrestrials, etc.). The measure was distributed in paper form and was also available electronically (to complete online). Respondents were recruited: face to face, by email and post. A sample of 1481 volunteer respondents completed the measure; 538 the paper version and 933 online. Female respondents constituted 75% of the sample and male 25%. The mean age was 27.44 years, ranging from 14 to 70 years.

Results: Exploratory factor analysis, principal component analysis, was performed and a promising nine factor structure emerged, accounting for 71% of the total variance. This contained item clusters measuring belief in: Hauntings (36%), Other Life (10%), Superstition (6%), Religious Belief (5%), Alien Visitation (4%), Extrasensory Perception (ESP) (3%), Psychokinesis (PK) (3%), Astrology (2%), and Witchcraft (2%).

Conclusions: It is considered that the approach adopted in the present study, combining several extant measures of paranormal belief and supplementing these with additional items (where omissions were identified), has produced a potential structure for a revised measure of paranormal belief.

Publications:

(2009). Dagnall, N., Munley, G., Parker, A., & Drinkwater, K. Common Paranormal Belief Dimensions. *Journal of Scientific Exploration.* (Manuscripts accepted pending amendments).

Keywords: paranormal belief – cognitive/perceptual - attentional bias.

120/06 - "Psicoendocrinologia do comportamento parental humano: Alterações hormonais, síndrome de couvade e responsividade parental em pais-expectantes" - "Psicoendocrinology of the human parental behaviour: Hormonal changes, Couvade syndrome and parent responsivity in expecting-parents"

Instituição/*Institution*: Centro de Investigação e Intervenção, Instituto Superior de Psicologia Aplicada, Lisboa - Portugal

Duração/*Duration*: 2007/02 - 2009/01

Investigadores/*Researchers*: Prof. Isabel Maria Pereira Leal, Prof. Rui Filipe Nunes Pais de Oliveira, Prof. Luís Adriano Neves Gonçalves Sobrinho, Dra. Rita Maria Morgado Gomez

Objectives: Animal studies have been documenting the association between hormonal changes and the emergence of parental behavior in both males and females of a variety of non-human species. Data on the psychoendocrinology of human parental behavior is very scarce, but preliminary findings by Storey et al. (2000), Berg and Wynne-Edwards (2001; 2002) and Fleming et al. (2002) showed that hormone levels of human fathers can change during the reproductive period. None of these pioneering studies, however, analyzed if hormone changes in expectant fathers associate with the expression of paternal behavior after birth.

Method: In this study, serum levels of prolactin (PRL) and salivary levels of testosterone (T), progesterone (P), estradiol (E2) and cortisol (CORT) were measured five times throughout the reproductive period (three times during pregnancy and two times after the birth) in an initial sample of 32 expectant fathers (EF). Hormone levels of 15 control men (C) were also measured at same time intervals. In addition, paternal behavior after the birth was evaluated in EF with psychometric measures.

Results: Fathers who presented higher levels of paternal behavior after the birth (HIF, high-involvement fathers), but not less involved fathers (LIF), showed increased levels of P and E2 during pregnancy comparing to postpartum hormone levels and to hormone levels of controls. In addition, PRL levels increased from the pregnancy to the postpartum period in HIF, but not in LIF, whereas CORT levels were significantly increased following the birth in LIF only. Finally, though T levels were high during pregnancy and low after the birth for all fathers, changes in T were more pronounced in HIF.

Discussion: Results are generally consistent with previous findings on the neuroendocrinology of paternal behavior in mammals, and add support to the hypothesis that in bi-parental mammals, including humans, the expression of paternal and maternal behavior involve homologous neuroendocrine mechanisms. Research in this area can contribute to 'validate' the experience of more involved fathers and to inform about conditions in which pro-social behavior, including parental investment, is compromised.

Publications:

- Gomez, R. & Leal, I. (2007). Vinculação parental durante a gravidez: Versão portuguesa da forma materna e paterna da 'Antenatal Emotional Attachment Scale'. *Psicologia, Saúde & Doenças, 8(2)*, 153-165.

- Gomez, R. & Leal, I. (2007) Envolvimento paterno no pós-parto: Estudo de validação da Escala de Confirmação das Expectativas Maternas de Suporte. *Psicologia: Teoria, Investigação e Prática*, *12(2)*, 305-317.
- Gomez, R. & Leal, I. (2008). Ajustamento conjugal: Versão portuguesa da *Dyadic Adjustment Scale*. *Análise Psicológica, 4 (26),* 625-638.
- Gomez, R. & Leal, I. (2009). Stress parental no período pós-parto: Adaptação do *Parental Stress Inventory* para a população portuguesa. *Psychologica, 50*, 375-386.
- Gomez, R., Wynne-Edwards, K., Oliveira, R., Sobrinho, L. & Leal, I. (submitted). Hormone changes from pregnancy to the postpartum in human fathers and paternal involvement after birth.
- Gomez, R., Oliveira, R. L. & Leal, I. (submitted). Hormonal, emotional and behavioral correlates of the couvade syndrome in Portuguese expectant fathers.
- Gomez, R., Leal, I., Oliveira, R. & Sobrinho, L.G (submitted). Maternal and paternal endocrine responses to infant-related stimuli during late pregnancy.
- Gomez, R., Oliveira, R. L., Leal, I. & Sobrinho, L.G. (in preparation). Hormonal and non-hormonal co-variates of maternal postpartum depression.
- Leal, I., Oliveira, R., Gomez, R. & Sobrinho, L. Couvade syndrome: a new contribution. . *In preparation.*

Award: *Graduate Student Presentation Award*. Parental Brain Conference 2007: Parenting and the Brain. Boston, MA, Junho de 2007.

Key-words: hormones; parental behavior; paternal involvement; pregnancy

125/06 - "Psychophysiological effects of human pheromones"

Instituição/*Institution*: Centro de Estudos e Intervenção Social, ISCTE, Lisboa - Portugal
Duração prevista/*Estimated duration*: 2007/05 - 2010/01
Investigadores/*Researchers*: Prof. Francisco Gomes Esteves, Prof. Mats Olsson, Dr. Johan Lundstrom, Prof. Pedro Barbas de Albuquerque, Prof. Maria Benedita Monteiro, Prof. Maria Paula Carneiro, Dra. Patrícia Arriaga Ferreira

Abstract: Although the existence of human pheromones is widely accepted among layman, scientific evidence is insufficient. The general goal of the project is to test emotional effects of exposure to a putative human pheromone *androstadienone* using psychophysiological measures and verbal affective ratings.

Experiment 1

Aim. The aim of the first experiment was to test effects of *androstadienone* on non-verbal flirt behavior in a controlled social-interaction situation.

Method. Sixty-five male and 65 female were randomly assigned to the experimental group (exposed to *androstadienone*) or the control condition. Pairs of two (one man and one woman) were formed, and instructed by two doubleblind female experimenters to perform collaborative tasks. The videotapes were analyzed on non-verbal signs of flirt behavior. Frequency of specific behaviors and several subjective ratings were measured.

Results. For the female group, the phase in the menstrual cycle was more important than the exposure to *androstadienone*, with more frequent flirt behavior present in the ovulation phase. For the male group no clear pattern was achieved.

Experiment 2

Aim. The aim of the second experiment was to test possible effects of *androstadienone* on psychophysiological measures (heart rate, skin conductance and startle reflex modulation) and mood changes (verbal evaluation) while and after viewing a series of emotional pictures.

Method. Female participants were randomly assigned by two doubleblind male experimenters to the experimental group (exposed to *androstadienone*) or a control condition. After this manipulation participants were exposed to a series of emotional pictures (depicting human social interactions) while their skin conductance, heart rate, and startle (elicited by white noise) were monitored. They also rated their subjective emotional state and mood.

Results: Preliminary results showed a trend for a general inhibition of the startle reflex in the experimental group, which could reflect a more positive mood in this group compared to the control condition. The complete analyses will be presented at the Symposium.

Key words: pheromones, mood, startle reflex

134/06 - "The role of stress in cortico-basal ganglia loop processing and instrumental conditioning"

Instituição/*Institution*: Life and Health Sciences Research Unit, School of Health Sciences, University of Minho, Braga - Portugal

Duração/*Duration*: 2007/01 - 2010/02

Investigadores/*Researchers*: Prof. Doutor Nuno Jorge Carvalho de Sousa, Dr. Rui Manuel Fernandes da Costa, Dr. Eduardo Miguel Gonçalves Dias Ferreira, Prof. Doutor João José Cardoso Cerqueira, Dr. Pedo Alexandre Teixeira

Abstract: The ability to shift between different behavioral strategies is necessary for appropriate decision-making. In this project, we investigated if chronic stress biases decision-making strategies, affecting the ability of stressed rats to perform actions based on their consequences. Using two different operant tasks, we uncovered that choices made by rats, and now confirmed for mice, submitted to chronic stress become insensitive to changes in outcome value and resistant to changes in action-outcome contingency. Furthermore, we demonstrated that chronic stress caused opposing structural changes in the associative and sensorimotor corticostriatal circuits underlying different behavioral strategies, with atrophy of medial prefrontal cortex (mPFC) and the associative striatum (dorsomedial striatum, DMS), and hypertrophy of the sensorimotor striatum (dorsolateral striatum, DLS). Therefore, we recorded the simultaneous activity of neuronal ensembles in mPFC, DMS and DLS of control and stressed mice during behavioral training and testing to investigate if the changes in wiring observed in the associative and sensorimotor circuits after chronic stress cause changes in neural activity in these circuits that could explain the bias in behavioral strategies towards habit.

In conclusion, the results obtained throughout this project demonstrate that chronic stress influences decision-making processes, through changes in the structure and activity of corticostriatal networks.

Publications:

Papers:

1. Dias-Ferreira E, Sousa JC, Melo I, Morgado P, Mesquita AR, Cerqueira JJ, Costa RM, Sousa N. (2009) Chronic stress causes frontostriatal reorganization and affects decision-making. **Science 325**:621-625.

Abstracts in International Conferences:

1. Dias-Ferreira E, Sousa JC, Melo I, Mesquita AR, Cerqueira JJ, Costa RM, Sousa N. (2008) Chronic stress causes corticostriatal reorganization and affects decision-making. Society for Neuroscience Abstracts, 38th Annual Meeting, Washington, DC, USA.
2. Dias-Ferreira E, Melo I, Jin X, Sousa J, Cerqueira J, Sousa N and Costa R (2009) Chronic stress affects decision-making strategies: structural and physiological correlates. Frontiers in Systems Neuroscience. Conference Abstract: Computational and systems neuroscience. doi: 10.3389/conf.neuro.06.2009.03.348. Salt Lake City, UT, USA.
3. Dias-Ferreira E, Melo I, Jin X, Sousa JC, Cerqueira JJ, Sousa N and Costa RM (2009) Chronic stress affects decision-making strategies: structural and physiological correlates. Frontiers in Neuroscience.

Conference Abstract:

1. 11th Meeting of the Portuguese Society for Neuroscience. doi: 10.3389/conf.neuro.01.2009.11.008. Braga, Portugal.
2. Dias-Ferreira E, Sousa JC, Jin X, Melo I, Cerqueira JJ, Sousa N, Costa RM. (2009) Physiological correlates of chronic stress-induced bias in behavioral strategies. Society for Neuroscience Abstracts, 39th Annual Meeting, Chicago, IL, USA.

Keywords: corticosteroids, decision-making, plasticity, striatum, multielectrode-recordings

137/06 - "Influências das Emoções e dos Sentimentos na Percepção do Tempo Cronológico" - "Influence of Emotions and Feelings upon the Perception of Chronological Time"

Instituição/*Institution*: Unidade de Investigação em Psicologia, do Desenvolvimento e da Educação, Instituto Superior de Psicologia Aplicada, Lisboa - Portugal

Duração prevista/*Estimated duration*: 2007/02 - 2010/03

Investigadores/*Researchers*: Prof. Teresa Maria Morais Garcia-Marques, Dr. Alexandre Constâncio Fernandes

Introduction: Internal-clock and attention-gate timing models (e.g. Gibbon et al, 1984) suggest that arousal and attention bias time processing. Affective stimuli by definition promote arousal and are known to capture attention towards them. These two factors have been shown to have opposite effects in time estimation (eg. Burle & Casini, 2001). In this project we developed a set of experiments to understand how these and other properties of affective stimuli impact time-perception. Physiological measures were used in order to assess those properties without disrupting the time estimation task, and to be able to approach their mediational effects. In addition, we approach non-emotional feelings such as familiarity and fluency. The focus of affect as a subjective experience of positivity and negativity associated to different levels of arousal provides a general framework to this work.

Methods: Using bisection tasks, timing scales and time reproduction, participants estimated the duration (0.4 to 1.6 s) of stimuli, manipulated in different ways: (1) negative and positive emotional faces (valence) with low and high expressivity (arousal); (2) the arousal level of both the stimuli to be evaluated and of a prime (that activate independently the arousal of participants); (3) level of familiarity and fluency with low and high attentional resources. Heart rate (HR) deceleration elicit by emotional stimuli onset was measured as an attention index (i.e., orientation response); facial EMG activity of Corrugator Supercilii (CS) and Zigomatic Major (ZM) muscles and frontal EEG alpha power asymmetry were measured as valence indexes; and skin conductance (SC) activity as an arousal index.

Results and Discussion: All studies suggest duration judgments to be affected by arousal. This effect was moderated by: emotion, valence and temporal task. Psychohysiological measures support all our manipulations and the mediational analysis reveals a more complex process of time processing of emotion stimuli than predicted by 'internal clock' model. In addition, our studies imply that feelings of familiarity/fluency of processing promote time overestimation; the effect is, in an unpredicted way, moderated by attention. All results are discussed considering the "internal-clock model" and alternative approaches (attributional, perceptual and cognitive serial changes, and embodiment cognition).

Publications (to date)**:**

Fernandes, A. C., & Garcia-Marques, T. (2008). Affective interference in temporal perception. *International Journal of Psychology*, 43 (3/4), 423-424.

Fernandes, A. C., & Garcia-Maques, T. (2009). Psychophysiological mediation effects of emotional faces impact in time perception. *Psychophysiology, 46* (S1), 52.

Keywords: Time perception, Emotion, Familiarity, Fluency, Psychophysiological mediators

147/06 - "Cognitive and affective trait effects of meditation-training on brain and behaviour. An event-related longitudinal fMRI study"

Instituição/*Institution*: Department of Psychology/Neuropsychology, University of Freiburg - Germany

Duração/*Duration*: 2007/03 - 2009/09

Investigadores/*Researchers*: Prof. Ulrike Halsband, Dr. Susanne Muller

Abstract: That meditation and relaxation training may be highly effective in promoting effective emotion regulation capacities could be indicated by previous (health) research. But in spite of a huge amount of empirical studies on meditation little is known about the process that leads to such positive changes and its impact on the brain. The considerable discrepancy among results is thereby most likely due to the heterogenity of meditation practices studied and the difficulty in controlling the degree of practitioners´ expertise. Concerning the participants there have been two different approaches in meditation research: (i) studies on advanced and highly skilled meditators and (ii) studies on novices which start meditation training usually in a clinical setting as adjuvant therapy.

The present study was one of the first fMRI studies to examine longitudinal meditation effects in a within-subject design. 17 persons started with an intensive meditation training in the tradition of Soto-Zen. The assessments (psychological, neurophysiological) were conducted before (baseline), during (3 months), after the training (6 months) and in a follow-up (9 months). Due to a drop out rate of almost fifty percent we kept on systematically evaluating the remaining seven persons during 9 months. Our main focus concerning the study group was on the process of enhancing sustained attention abilities through meditation as well as developing a mindful attitude. By studying the neural mechanisms underlying attention we analyzed their relation to changes of emotional and socio-behavioural traits. The experimental paradigm used in combination with brain-imaging by fMRI was the one of „binocular rivalry", which has recently gained wider prominence as a tool for studying (visual) consciousness and focused attention.

After six months clear affects could be found in all participants, marked by activations in frontal brain regions indicating enhanced capacities for selective attention after an intensive meditation training. On the single subject level it became clear that there were remarkable changes in some of the subjects concerning mindfulness, well-being, clarity to and repair of their own feelings and even in the paradigm of binocular rivalry.

Taken together, the findings advance our understanding of the neural mechanisms that underlie meditation effects. Further studies with a greater sample size as well as qualitative studies that would bring a lot more insight in the psychological mechanisms that accompany intensive meditation trainings are strongly recommended.

Publications:

1. Mueller, S., Halsband, U. (to be submitted). Cognitive and affective trait effects of intensive zen-meditaion training on brain and behaviour. An event-related longitudinal fMRI study.

2. Halsband, U., Mueller, S., Hinterberger, T., Strickner, S. (in press). Plasticity changes in the brain in hypnosis and meditation. *Contemp. Hypnosis* 26(3): 000–000 (2009)

Key words: brain plasticity, fMRI, zen meditation, binocular rivalry

154/06 - "High-frequency oscillations and rhythmic slow activity during virtual navigation, REM sleep and wake-sleep transitions: Studies on intracranial recordings in humans"

Instituição/*Institution*: Budapest-Bethel Epilepsy Center Foundation (BBEC), Budapest - Hungary

Duração*/Duration*: 2008/01 - 2009/10

Investigadores/*Researchers*: Prof. Péter Halász, Dr. Zsófia Clemens, Dr. Csaba Borbély, Dr. Daniel Fabó

Objectives: To examine possible phase-relation between high-frequency (gamma) and rhythmic slow activity (RSA) during REM sleep in human mesiotemporal EEG recordings. To seek for analogies between the animal hippocampal theta and the human mesiotemporal RSA during REM sleep.

Methods: The study relied on nine epilepsy surgery candidates implanted with bilateral semi-invasive foramen ovale electrodes placed beneath the mesiotemporal surface. Positive half-waves of the 1.5–3 Hz RSA were identified by a semi-automatic algorithm during REM sleep. High-frequency activity was assessed for 11 consecutive 20 Hz–wide frequency bands between 20 and 240 Hz. To investigate time relations between RSA oscillation and high-frequency activity the
root mean square of each high-frequency band was averaged for intervals of 0.5 s around all detected RSA oscillation peaks.

Results: RSA at 1-5-3 Hz was a striking feature of most foramen ovale recordings during REM sleep. Increase in high frequency activity was phase coupled with RSA in most frequency bands and patients. The phase of the highest gamma activity increase was similar across increasing high frequency bands and typically occurred shortly (~0.1 s) before the RSA peak used as trigger. Highest level of modulation was found for the middle high frequency bands (60-80 Hz and 80-100 Hz) which gradually weakened across both decreasing and increasing high-frequency bands.

Conclusions: Such a phase coupling closely resembles that seen between theta and gamma in rodents. We consider this commonality to be an additional reason for regarding the 1.5-3 Hz delta rather than theta as the human analogue of RSA in animals.

Publications*:* Clemens Z, Weiss B, Szűcs A, Erőss L, Rásonyi G, Halász P. Phase coupling between rhythmic slow activity (RSA) and gamma characterizes mesiotemporal REM sleep in humans. 2009. Neuroscience; 163:388-96.

Keywords*:* hippocampus, rhythmic slow activity, theta, mesial temporal lobe epilepsy

157/06 - "Enhancing Hit Rates on Psi Tests with Optimal Levels of Transliminality"
Instituição/*Institution*: Integrated Knowledge Systems Inc., Springfield - USA
Duração/*Duration*: 2007/01 - 2008/07
Investigador/*Researcher*: Dr. James Houran

Objectives: We explored experimenter effects in an experiment with the Chinese book of divination the *I Ching*, which contains 64 hexagrams (6-line structures) and associated readings.

Methods: Three coins are thrown six times to generate one of these hexagrams. Participants and Experimenters (*N* = 120) were recruited based on scoring patterns on Transliminality and Paranormal Belief to produce four experimental groups (*N* = 15 pairs each) of varying levels of Paranormal Belief and Transliminality: High/High; High/Low; Low/High and Low/Low. Participants selected 16 of 64 hexagram-descriptor pairs, based on their emotional or cognitive states of mind. A "hit" was observed when 1 of the 16 choices would come up (P_{mce} = .25). It was predicted that the hit rate of the High/High group would be significantly greater than chance, the High/High group would score significantly higher than the three control conditions (High/Low, Low/High, Low/Low) and that the three control conditions would score similarly. It was further expected that Transliminality, Paranormal Belief and Sex would show main and interaction effects for hit rate on the *I Ching* task.

Results: The hit rate on Hexagram 1 was 28 out of 60, or 46.7% which far exceeds the 25% chance level and the High/High group did have the highest raw score hit rate, but there were no significant main or interaction effects of Transliminality, Paranormal Belief or Sex.

Conclusions: These surprising findings suggest that the specific differences in experimental protocols between the present study and past research are partly responsible. The two main differences discussed involve (i) the notion of spontaneity and ambiguity related to the task and (ii) treating psi outcomes on the *I Ching* as a Rasch-trait variable rather than as independent observations.

Publications:
Houran, J. (2007). Entropy and environmental mystery: A parapsychological perspective. *Perceptual and Motor Skills*, 105, 688-690.
Houran, J., & Lange, R. (2009). Searching for an optimal level of transliminality in relation to putative psi. *Journal of the Society for Psychical Research*.
Houran, J., & Lange, R. (in preparation). *I Ching* outcomes from experimental manipulations of transliminality and paranormal belief.

Keywords: *I Ching*, transliminality, paranormal belief, experimenter effects, psi, precognition

161/06 - "The relation of mind to body. Psychophysiological studies of the placebo effect"

Instituição/*Institution*: Department of Psychology, University of Tromso - Norway
Duração prevista/*Estimated duration*: 2007/01 - 2010/03
Investigadores/*Researchers*: Prof. Magne Arve Flaten, Prof. Oddmund Johansen, Dr. Terje Simonsen, Mr. Per M. Aslaksen, Mr. Peter Lyby, Dr. Espen Bjorkedal

Objectives: Placebo analgesia refers to the observation that pain is often reduced after administration of a placebo with information that it contains a powerful painkiller. The information has been found to generate an expectation of reduced pain, hypothesized to activate descending, endorphin mediated pain inhibitory mechanisms. This series of experiments tested the idea that reduced stress and negative emotions mediate the effect of the expectation of pain relief.

Methods: In all studies, placebo analgesic responding was defined as the difference in pain levels between a group or condition were subjects received inactive treatment with information that it reduced pain, and a group or condition where no treatment and no information was administrated. Pain was induced in healthy volunteers via a thermode where temperatures were increased (Experiments 1-4) or decreased (Experiment 5) to painful levels. Pain was recorded by visual analogue scales (VAS), by event related potentials (ERPs), or heart rate variability. Emotions were recorded by VAS and the Fear of Pain Questionnaire. Expectations were induced via information (Experiment 1-4) or via a classical conditioning procedure where pain levels were reduced after administration of placebo capsules to induce an expectation of reduced pain after intake of the capsules (Experiment 5). Placebos were capsules containing lactose (Experiments 1,2,4,5) or other procedures that could affect pain (diffuse noxious inhibitory control, Experiment 3).

Results: Information that a painkiller had been administrated reduced pain and event related potentials to painful stimulation. Regression analyses found that high levels of stress or negative emotions prior to onset of the experiment, predicted reduced placebo analgesia. Individuals that were fearful of pain had higher stress levels, more pain, and displayed reduced placebo analgesia. Increased pain after placebo administration was observed in some of these individuals. Fear of pain predicted event related potential amplitude.

Conclusions: Placebo responses could be seen in subjective and neurophysiological response to painful stimulation. Higher levels of negative emotions prior to painful stimulation reduced placebo analgesic responding, and subjective stress levels were lower in subjects receiving placebo compared to subjects not receiving any treatment. Thus, reduced negative emotions could be one mechanism in placebo analgesia.

Publications:

Aslaksen, P.M., Myrbakk, I.N., Høifødt, R.S., & Flaten, M.A. (2007). The effect of experimenter gender on autonomic and subjective responses to pain stimuli. *Pain, 129*, 260-268.

Aslaksen, P.M., & Flaten, M.A. (2008). The roles of physiological and subjective stress in the effectiveness of a placebo on experimentally induced pain. *Psychosomatic Medicine, 70,* 811-818.

Åsli, O., Kulvedrøsten, S., Solbakken, L., & Flaten, M.A. (2009). Fear potentiated startle at short intervals following conditioned stimulus onset during delay but not trace conditioning. *Psychophysiology, 46,* 880-888.

Flaten, M.A. (in press). The role of anticipatory agonistic and antagonistic processes in the response to drugs. *Scandinavian Journal of Psychology*

Lyby, P.S., Flaten, M.A., & Aslaksen, P.M. (in press). Is fear of pain related to placebo analgesia? *Journal of Psychosomatic Research*

Flaten, M.A. (in press). Expectations of pharmacological treatment and their effects on adjustment. In D.A. Powell (ed.) *Central nervous system control of learned autonomic adjustments.* New York: Research Signpost.

Bjørkedal, E., Lyby, P.S., Aslaksen, P.M., Figenschau, Y., & Flaten, M.A. (submitted). The role of experimenter gender in classical conditioning of placebo analgesia.

Aslaksen, P.M., Lyby, P.S., Vambheim, S.M., Thorvaldsen, J., Flaten, M.A. (submitted). Event-related potentials to painful stimulation confirm gender effects in placebo analgesia.

Keywords: Placebo effect, placebo analgesia, pain, event related potentials, emotion.

162/06 - "Paranormal Healing, Paranormal Belief, and Physical and Psychological Well-Being"

Instituição/*Institution*: Koestler Parapsychology Unit, Psychology Department, University of Edinburgh - UK

Duração/*Duration*: 2007/01 - 2009/03

Investigadores/*Researchers*: Dr. Caroline Watt, Dr. Alison Easter

Objectives: Study 1 aimed to assess the role of healing belief and expectancy in the outcome of distance healing in arthritis patients. Study 2 aimed to profile the psychological characteristics of individuals practicing distance healing. Study 3 aimed to uncover key aspects of the phenomenology of distance healing in a supportive culture.

Methods: Study 1 was a randomized controlled trial. Sixty arthritis patients received distance healing, using a semi-masked design to assess the effects of expectancy. Healing outcome was measured through self-reported pain, health and well-being questionnaires. Study 2 administered questionnaires on personality, spirituality, and boundary thinness to 130 distance healers. Study 3 used Interpretative Phenomenological Analysis to analyse transcripts of in-depth interviews with fifteen healees based in Sri Lanka.

Results: Study 1 found no evidence for the efficacy of distance healing for arthritis sufferers, and found that generalized belief in distance healing had little effect on health and well-being. Knowledge about condition allocation was related to outcome, suggesting that expectancy plays an important role in perceived healing. Study 2 found that, compared to general population norms, distance healers had extremely high levels of spiritual connectedness, permeable boundaries, frequent experience of exceptional phenomena, high levels of agreeableness and openness, and were driven by a compassionate desire to help others. Study 3 found five themes emerged as a result of the IPA analysis, with these themes being linked by the overall concept of 'empowerment'.

Conclusions: In addition to the findings already described, Study 1 suggested further investigation of individual differences in healer efficacy. Study 2 raised the question of whether distance healers are less ego-driven than has been suggested for those who practice laying-on-of-hands. Study 3 suggested that the experience of healing in a supportive cultural context may be quite different to that found in a Western context where healing is regarded as an alternative to orthodox medicine.

Publications:

Easter, A. & Watt, C. (2008). Paranormal healing, paranormal belief, and physical and psychological well-being in arthritis sufferers. *Proceedings of the 51st Annual Convention of the Parapsychological Association & 32nd Annual Convention of the Society for Psychical Research*, pp.338-340. Winchester, England, August 13-17. (research brief)

Easter, A. & Watt, C. (2009). Paranormal healing, paranormal belief, and physical and psychological well-being in arthritis sufferers: A small scale clinical trial. *Proceedings of the 52nd Annual Convention of the Parapsychological Association. Seattle, USA,* August 6-9 (full paper).

Keywords: Distance healing; remote healing; paranormal healing.

163/06 - "Effects of hypnotizability on EEG and autonomic concomitants of imagery and emotion production" – only abstract available

Instituição/*Institution*: Serbsky National Research Centre for Social and Forensic Psychiatry, Moscow - Russia

Duração/*Duration*: 2007/06 - 2009/07

Investigadores/*Researchers*: Dr. Zvonikov Vyacheslav Michailovich, Prof. Stroganova Tatiana Alexandrovna, Dr. Anna Kirenskaya, Dr. Vladimir Novototsky-Vlasov, Mr. Andrey Chistyakov

Objectives: The aim of the study was to disclose the EEG and autonomic concomitants of the hypnosis, internal imaging and positive and negative emotional experience in subjects with low, medium and high levels of hypnotic susceptibility.

Methods: 19 high (H), 12 medium (M) and 12 low (L) hypnotizable subjects participated in 2 experimental sessions - hypnotic (HS) and waking (WS). EEG (19 sites), heart rate (HR) and skin conduction changes (SC) were recorded during the eyes-closed baseline condition, hypnotic relaxation in HS and inner silence condition in WS, and recollection of emotionally neutral, positive and negative past events. EEG spectral power and coherence analysis was applied.

Results: Subjective scores of image vividness and emotion intensity were significantly higher in H subjects compared to L ones. Distinct increase of HR and SC was observed during the recollection of past events depending on emotional load compared to baseline in the group H both in HS and WS. HR and SC changed insignificantly in the group L. The study showed the stable and significant EEG differences between three groups in all functional conditions, including baseline. Three main EEG features distinguished group H from both other groups - increased spectral power (SP) of theta1 and theta2 bands and significantly higher coherence (Coh) within theta1, theta2, and alpha1 bands; SP and Coh within beta2 and gamma1 ranges were lower in H subjects compared to L ones. These differences were generalized. Greater SP and Coh during HS as compared to WS were found within theta – alpha ranges only for H subjects. No clear SP differences between HS and WS were revealed in L group. The reactive EEG changes during the image and emotional loads were revealed in all frequency ranges in H subjects. In L group SP changes were non-significant both at the low (delta - theta) and high (gamma2) frequency ends of the spectrum, and Coh changes didn't involve delta - theta ranges. All M subjects' scores were intermediate between H and L ones. At that, patterns of EEG changes were frequency as well as hemispheric-specific depending on emotional valence only in H subjects.

Conclusions: The ability to experience emotions and inner images with the close to real life intensity is H subjects' distinctive feature that is associated with high theta-alpha1 SP and coherence level in all conditions and encompassing of entire EEG frequency range changes under functional loads.

Publications:

1. T.B.Dmitrieva, A.V.Kirenskaya, V.Y. Novototsky-Vlasov, A.N.Chistyakov, V.M.Zvonikov. EEG concomitants of emotional experience. // Int.J.Psychophysiol., 2008, 69(3), p. 200.
2. A.N.Chistyakov, A.V.Kirenskaya, V.Y.Novototsky-Vlasov, V.M.Zvonikov. The influence of sub-modal parameters changes of mental images related to past emotional events on intensity of the re-experienced emotions: psychophysiological study. // Fourth International Congress «Neuroscience for Medicine and Psychology», Sudak, Ukraine, 2008, p. 324.
3. V.M.Zvonikov, A.N.Chistyakov, A.V.Kirenskaya, V.V.Myamlin. The efficiency of inner images transformation in psychotherapeutic process. // Vestnik vosstanovitelnoj mediciny, v.30, N 2, p. 37-41. (In Russian).

Keywords: hypnotizability, inner images, emotions, EEG spectrum.

165/06 - "The sense of self in the brain: neural correlates of self-recognition"
Instituição/*Institution*: Department of Psychology, Royal Holloway, University of London - UK
Duração/*Duration*: 2007/09 - 2010/01
Investigadores/*Researchers*: Dr. Emmanouil (Manos) Tsakiris, Dr. Angela Sirigu, Prof. Patrick Haggard, Dr. Matteus Joffily

Objectives: Two important aspects of self-consciousness are the sense of one's own body (so-called 'body-ownership') and the sense that one controls one's own bodily actions (agency). The exact relation between these has been the focus of much speculation, but remains unclear. We distinguish two models of their relation. On an 'additive' model, agency and body-ownership are strongly related, because the ability to control actions is a powerful cue to body-ownership. This view implies a component common to the senses of body-ownership and agency, plus possible additional components unique to agency. An alternative 'independence' model holds that agency and body-ownership are qualitatively different experiences, triggered by different inputs, and recruiting distinct brain networks.

Methodology: We developed a paradigm to investigate sensory and motor aspects of body representation in the brain using fMRI. Participant's either made self-generated finger-movements, or remained passive while similar movements were applied to their fingers by an external force, while seeing a video image of their hand either in real-time or with a systematic delay that generated a conflict.

Results: Activations in midline cortical structures were associated with a purely sensory-driven sense of body-ownership, and were absent in agency conditions. In contrast, activity in the pre-SMA was linked to the sense of agency, but distinct from the sense of body-ownership. Importantly, no shared activations that would support the additive model were found.

Conclusions: The results support an independence model of agency and body-ownership, and do not support the additive model. Agency and body-ownership appear to be qualitatively different experiences, representing two distinct components of self-recognition. The feeling of ownership over one's body involves a psychophysiological baseline, linked to activation of the brain's default mode network. Agency over one's body is linked to premotor and parietal areas involved in the generation of motor intentions and subsequent action monitoring.

Publication:
Tsakiris M, Longo M & Haggard P. Having a body versus moving your body: neural signatures of body-ownership and agency*., under review*

Keywords: agency, body-ownership, supplementary motor area, angular gyrus, cortical midline structures, self-recognition

167/06 - "A Study to Assess the Validity of Applied Kinesiology (AK) as a Diagnostic Tool and as a Nonlocal Proximity Effect"

Instituição/*Institution*: Laboratories for Fundamental Research, California - USA
Duração/*Duration*: 2007/02 - 2010/01
Investigadores/*Researchers*: Dr. Stephan A. Schwartz, Dr. Ginette Nachman, Dr. William Frazer Morris

Abstract: Is there a difference in muscle strength when individual holds substance inimical to life (poison), compared to substance essential (normal saline)? Does effect involve person measured, and kinesiologist measuring, or only person measured? Is result the same when different kinesiologists take measurement, or when no kinesiologist involved? Does belief, expectation, gender, or time cognition influence response? 51 participants tested three trials, first one kinesiologist, then another finally by grip strength using hand dynamometer. Each trial: two randomly numbered sealed vials in randomly numbered bag. Bag: one vial saline solution, second saline and ionic hydroxlamine hydrochloride (NH3OH)+. All at trial blind to toxin vial. All preparing vials blind to trials. Kinesiologist force measured by pressure pad. No kinesiologist present dynamometer trials. Results: 151 sets of trials toxic vial identified 80 (53%), one-tailed exact binomial p-value 0.258. Two kinesiologists almost exactly at chance. Third kinesiologist produced one-tailed exact binomial p-value 0.18 (unadjusted multiple testing). Dynamometer results almost exactly chance. Testing difference participants for whom AK test worked based on belief whether would work non-significant chi-square, 0.6 (p = 0.439) AK trials, and 2.222 (p = 0.136) for dynamometer trials. Gender: no significant difference males and females for male kinesiologist trials, or the hand dynamometer. Combined data two female kinesiologists revealed difference. 33 female sessions15 successful (45%); 18 sessions males, 14 successful (78%) resulting in chi-square 4.96, p = 0.026. Given multiple chi-square tests results seen with caution. Belief in whether or not AK test will work not significantly related whether did work. Chi-square test of relationship between time perception and correct vial choice no significant relationship. Chi-square relationship using dynamometer 0.927, p-value = 0.629. Literature review from AK field itself (Klinkoski and Leboeuf, 1990), 50 papers published,1981 and 1987 by the International College of Applied Kinesiology, survey by Hall, Lewith, Brien, and Little (2008), using standard evaluation criteria (QUADAS, STARD, JADAD and CONSORT), plus Radin 1984, Quintanar and Hill 1988, Braud 1989, Arnett, Friedenberg, and Kendler 1999, and Kendler and Keating 2003, suggests: Research published AK field not reliable; experimental studies by others to accepted standards AK not reliable diagnostic tool.

Publication: Submitted to *BMJ (British Medical Journal)*

Keywords: Applied Kinesiology, Muscle Testing, Diagnostic Test

170/06 - "Seeing the future: Exploring presentiment with eye gaze and pupillary dilation" - only abstract available
Instituição/*Institution*: Institute of Noetic Sciences, California - USA
Duração/*Duration*: 2007/01 - 2008/10
Investigador/*Researcher*: Dr. Dean Radin

Objective: A broad range of human activity is involved in anticipatory behavior, from the placebo effect, to predicting the next influenza strain, to catching a baseball. Conventional models of anticipation assume that events unfold in a unidirectional flow of time, strictly from past to future. This assumption was tested using the behavior of the eye as a means of detecting unconscious perceptions of future events.

Method: Pupillary dilation, spontaneous blinking, and eye movements were tracked before, during and after participants viewed photographs with varying degrees of emotional affect. Photos were selected uniformly at random, with replacement, from the International Affective Picture System. Eye data prior to exposure to emotional vs. calm photos were compared using nonparametric differential procedures. Eye data were predicted to show larger anticipatory responses before emotional photos than before calm photos under conditions that excluded sensory cues, statistical cues, and other conventional means of inferring future events.

Results: Pupillary dilation and spontaneous blinking increased more before emotional vs. calm photos (combined $p = 0.00009$). Horizontal eye movements indicated a brain hemisphere asymmetry before viewing the photos that was appropriate to both the emotionality ($p = 0.05$) and the valence of the future images ($p = 0.01$). Overall females tended to perform better than males.

Conclusion: In agreement with the outcomes of previous studies using other physiological variables to detect “presentiment” effects, this experiment suggested that comprehensive models of anticipatory behavior may require consideration of transtemporal influences from the future.

Publication:
Radin, D. I. & Borges, A. (2009). Intuition through time: What does the seer see? *Explore: The Journal of Science and Healing.* 5(4), 200-211.

Keywords: anticipation, presentiment, pupil dilation, blinking

174/06 - "Experimental Investigation of a Psi Training Program"

Instituição/*Institution*: Institute of Noetic Sciences, California - USA
Duração/*Duration*: 2007/05 - 2009/01
Investigadores/*Researchers*: Dr. Marilyn Schlitz, Dr. Dean Radin, Dr. Cassandra Vieten, Dr. Colin Cherot

Objectives:
1) Test the claim that transformative practices may lead to enhanced intuitive experiences. **2)** Develop a well-controlled experimental design for the "feeling of being stared at" paradigm that can be adapted to naturalistic settings, using the internet as a medium for carrying live video images.

Methods: We tested sixteen people who had been practicing the Transcendental Meditation TM-Sidhi technique for a minimum of 10 years, and 16 adult non-meditators.
One person is a sender (S) and one a receiver (R).
S viewed a screen showing a live video streaming image of the distant Receiver during sending periods, and during no-sending periods, S viewed a randomly selected static picture from a pool of pre-selected neutral photographs.
R viewed a web page that informs R that a trial is in progress, but does not indicate whether the distant sender was viewing their image or not. R is asked "Are you being stared at?"
Five seconds after each trial began, R saw a count-down timer and had 15 seconds to respond "yes" or "no." If no response was received within 15 seconds, the trial was recorded as a pass. If R did respond, feedback was provided indicating that the response was correct or incorrect. S also saw this feedback. The assignment of staring vs. non-staring conditions per trial was determined by a random process.

Results: The two groups showed no differences in self-rated ability to perceive someone staring at them, in how well they thought they would do in the test, or in self-assessed psychic abilities. However, the non-meditator group reported having had the feeling of being stared at significantly more than the meditators.
Overall the control group performed slightly, but non-significantly better than the meditation group. On average the meditation group performed closely to chance expectation over the entire sequence of 100 trials, but the control group progressively improved.
Meditators reported higher levels of self-transcendence than non-meditators.
Contrary to prediction, meditators reported higher levels of stress than the controls.

Conclusion: Overall, this study did not show that attention training, in this case specifically meaning the technique known as the TM-Sidhis, would improve performance on a "feeling of being stared at" task.
The TM group's self-transcendence scores were significantly higher than the control groups, but contrary to prediction, their perceived stress scores were not lower.
The most consistent finding in this experiment was the sheep-goat effect: Participants' expectations and beliefs was the best predictor of their actual performance.
Keywords: Meditation, attention, intuition, transformation, Psychic

196/06 - "Effect of the comprehensive Art of Living yogic breathing programme on the physiological and psychological well-being"

Instituição/*Institution*: The Art of Living Foundation Croatia, Zagreb – Croatia
Duração /*Duration*: 2007/04 - 2009/09
Investigadores/*Researchers*: Dr. Sanja Kostrun, Dr. Irena Svenda, Dr. Sanja Kordic, Prof. Fahri Saatvcioglu, Mr. Hrvoje Tadic, Dr. Hujic Aleksandra

Abstract: The aim of this study was to investigate the effect of the AOL yogic breathing program[1-7] on the physiological and psychological well-being of healthy volunteers and to determine significantly changed markers in order to use them in subsequent studies. Both, experimental and control groups consisted of 40 healthy volonteers.
Comprehensive program consisting of yogic postures, unique breathing exercises, relaxation techniques and stress management has been applied. Effect was measured by; a) physiological parameters – metabolic, inflammatory, oxido-reductive and stress status, as well as cardiovascular and autonomic system parameters, and b) psychological parameters - general health status, satisfaction with life, quality of life, self-esteem, emotional status, anxiety and neuroticism. The study included pre-post test design with wait-listed control group. Intervention group participated in the initial 6 day course, with regular daily home practice and weekly follow-ups for a period of 3 months.
Results of this study show: a) psychological parameters - significant decrease in anxiety and negative emotions, significant increase of positive emotions, increase in self-esteem and overall satisfaction with life. Health self-estimate shows that after the course participants exibit better social functioning, smaller emotional barriers regarding everyday challanges, increased health self-estimate, better mental health and vitality; b) physiological parameters – significant decrease of total and LDL cholesterol, and slight increase of cortisol were measured immediately after the course. Statistically significant decrease of total cholesterol and diastolic pressure, and slight increase of super oxide bismutase and C-reactive protein were measured 3 months after the course. Most significant changes were measured for spirometric parameters pointing to improved pulmonary function.
The changes of psychological parameters were most prominent immediately after the course, while changes in physiological parameters show slower trend. Significant improvement in psychological parameters decrease with the time showing the need for regular practice of the AOL program to keep positive changes initiated during the workshop. Physiological parameters show smaller changes that are additionally shielded by the large deviations of biomedical parameters. In order to improve statistical power for studied physiological parameters, larger number of subjects should be included.

Publications:

1. Naga Venkatesha Murthy, P.J., Gangadhar, B.N., Janakiramaiah, N., Subbakrishna, D.K. (1997). *Normalization of P300 Amplitude following Treatment in Dysthymia.* Biological Psychiatry, 42, 740-743.
2. Janakiramaiah, N., Gangadhar, BN., Naga Venkatesha Murthy, P.J., Harish, M.G., Subbakrishna D.K., Vedamurthachar A. (2000). *Antidepressant efficacy of Sudarshan Kriya Yoga (SKY) in melancholia: a randomized comparison with Electroconvulsive therapy (ECT) and Imipramine*. Journal of Affective Disorders. 57(1-3):255-9.

3. Bhatia, M., Kumar, A., Kumar, N., Pandey, R.M., and Kochupillai, V. (2003). *Electrophysiologic evaluation of Sudarshan Kriya: an EEG, BAER, and P300 study*. Indian J. Physiol. Pharmacol. 47, 157-163.
4. Kochupillai, V., Kumar, P., Singh, D., Aggarwal, D., Bhardwaj, N., Bhutani, M., DAS, S.N. (2005). *Effect of rhythmic breathing (sudarshan kriya and pranayam) on immune functions and tobacco addiction*. Ann N Y Acad Sci. 1056:242-52.
5. Brazier, A., Mulkins, A., Verhoef, M. (2006) *Evaluating a yogic breathing and meditation intervention for individuals living with HIV/AIDS*. Am J Health Promot. 20, 192-195.
6. Kjellgren, A, Bood, SA, Axelsson, K, Norlander, T, Saatcioglu, F.(2007) *Wellness through a comprehensive Yogic breathing program - A controlled pilot trial*. BMC Complement Altern Med. 7:43-50.
7. Sharma H, Datta P, Singh A, Sen S, Bhardwaj NK, Kochupillai V, Singh N. (2008) *Gene expression profiling in practitioners of Sudarshan Kriya*. J Psychosom Res. 2008 Feb;64(2):213-8.

Keywords: Art of living program, breathing techniques, stress release

2008

23/08 - "A Test for Mindfulness – The Bistable Images Test"
Instituição/*Institution*: University of Northampton, School of Social Sciences – UK
Duração prevista/*Estimated duration*: 2009/01 - 2010/03
Investigadores/*Researchers*: Prof. Harald Walach, Dr. Ursula Mochty

Objective: This study aims to follow up results obtained from a previous pilot experiment on the empirical investigation of mindfulness. Currently self-rating questionnaires are in use, but, to date, no objective assessment for mindfulness is available to quantify this construct. Recent studies point towards improvement in attention by means of systematic meditation training. The aim of this study is to overcome some of the weaknesses of self-ratings and develop a quick and simple objective test for the assessment of mindfulness and attention. The bi-stable images test presents the Necker Cube illusion, where two shapes can be perceived in the same image. As mental training of attention is a core ingredient of meditation, it should be possible to influence the amount of image reversals, and indicate changes in mindfulness and attention.

Method: We measured average reaction time and amount of image reversals during 2 4-min presentations of the Necker Cube illusion (with/without instruction to hold each reversal), and individual average reaction time to a 2-min alternating images reaction task (3x) for both experienced meditation and non-meditation group. Two mindfulness questionnaires, a short attention test, and an anxiety and depression scale were conducted for correlation with and control of side effects for obtained test data.

Participants: 38 meditators (min. meditation experience of 5 years) and matched 38 non-meditators (N=76) were tested.

Results: We report significantly negative correlations between meditation hours/week and anxiety, depression, sex, and total amount of reversals. The higher meditative practice was per week, the higher mindfulness and the longer an image could be held with instruction. Meditation hours/week and concentration were determined as possible predictors for mindfulness.

Conclusion: The relationship of significantly lesser image reversals with higher meditative practice is encouraging evidence that the bi-stable images test could be an objective test tool for assessment of meditation.

Keywords: Meditation, binocular rivalry, attention

56/08 - "The Sheep-Goat effect as a matter of compliance vs. noncompliance: The effect of reactance in a forced-choice ball selection test" - only abstract available

Instituição/*Institution*: Anomalistic and Transpersonal Psychology Research Unit, School of Psychology, Deakin University, Burwood - Australia

Duração prevista/*Estimated duration*: 2009/03 - 2010/04

Investigadores/*Researchers*: Dr. Lance Storm, Prof. Suitbert Ertel, Dr. Adam Rock

Abstract: Parapsychological research findings suggest that the motivations of believers in psi (sheep) and skeptics (goats) tend to be antithetical. According to Reactance Theory (Brehm & Brehm, 1981), when an individual's freedom is threatened through some form of coercion, *reactance* usually sets in, which is "a motivational state aimed at restoring the threatened freedom" (Silvia, 2005, p. 277). Reactance even leads to 'boomerang effects' (i.e., noncompliance). It is proposed that sheep comply with experimenter's instructions, whereas goats do not, which may explain the so-called sheep-goat effect (i.e., sheep tend to psi-hit; goats tend to psi-miss). In this study, the effects of reactance on psi performance is sought in Ertel's (2005a,b) Ball Selection Test. Specifically, it is proposed that a reactance treatment (an opinionated communication meant to evoke a reactance response) affects goats more than sheep, so that goats psi performance will be more adversely affected than sheep. This proposition is based on the hypothesis that sheep are less reactant than goats in psi tests because goats are predisposed to *disproving* the psi hypothesis which requires noncompliance. The sheep-goat measure to be used in the study is the Australian Sheep-Goat Scale (Thalbourne, 1995). The opinionated communication is an adapted text used succesfully by Silvia (2005). In a laboratory setting, in a single session, participants each complete up to four runs (60 trials/run) of paranormal target-seeking (i.e., calling numbers prior to selecting unseen numbered ping pong balls from a black bag). Psi effects will be statistically determined as a percentage of succesful calls (where P_{MCE} = 20%). Total number of participants to be tested is 150. Interim results only (N = 53) are as follows: (i) Hit rate was significant for the whole sample at 21.41% (p = .0002; ES = .04); (ii) Mean hit rate for sheep (21.76%) was higher than goats (21.23%), but not significantly, $F(1, 49) = 0.43$, p = .257 (one-tailed); (iii) Reactance affected scoring in the hypothesised direction, but not significantly, $F(1, 49) = 1.19$, p = .140 (one-tailed); and (iv) against our hypothesis, goats were less reactant than sheep, but not significantly, $F(1, 49) = 0.70$, p = .204 (one-tailed). The groups are too small, and therefore they lack power, so no firm conclusions can be made at this stage.

Keywords: ESP, PK, reactance, psi, sheep-goat effect

59/08 - "Generating Psi with optimal levels of Transliminality - a critical replication and extension"
Instituição/*Institution*: Integrated Knowledge Systems, Springfield - USA
Duração/*Duration*: 2009/01 - 2009/12
Investigador/*Researcher*: Dr. James Houran

Objectives: Intuition, which has been linked to precognitive processes, has received increasing attention and study as a component of managerial decision-making. The conceptualization of intuition as a non-sequential information processing mode, which comprises both cognitive and affective elements and results in direct knowing without any use of conscious reasoning, strongly suggests that transliminal processes are involved in the production or moderation of these experiences.

Methods: To test this idea, an online sample of 889 individuals spanning four management levels completed measures of Transliminality, Intuitive Decision-Making Style and a new measure of Self-Reported Intuitions in the workplace.

Results: Self-reported intuitions significantly correlated with an Intuitive Decision-Making Style and Transliminality. Contrary to some earlier research, sex of participant was not confirmed as a consistent predictor of intuitions. Further, self-reported intuitions increased with higher management level, independently of transliminality.

Conclusions: The findings were consistent with a two-mechanism model of intuition whereby transliminality equates to intuitive predisposition which is subsequently honed or reinforced over time by tacit knowledge that comes from work experience or structured training. Situational and motivational factors, akin to experimental effects in psi research, contribute to the process. Rasch scaling analyses found that transliminality and intuition form a continuum, with the highest levels of transliminality being associated with intuitions that are described as paralleling psychic ability.

Publications:
Houran, J. (in press). A parapsychological perspective on a recent study of “intuitions in the workplace.” *European Journal of Parapsychology*.
Houran, J., & Lange, R. (in preparation). “Flashes of Genius:” An exploration of perceptual-personality variables that produce intuitions in the workplace.
Lange, R., & Houran (in press). Transliminal view of intuitions in the workplace. *North American Journal of Psychology*.
Lange, R., & Houran, J. (submitted). *I Ching* outcomes from experimental manipulations -- further studies.

Keywords: Transliminality, intuition, mental boundaries, decision-making, experimenter effects

66/08 - "Spirituality, religious coping and paranormal beliefs and their relation to OCD and anxiety disorders' symptomatology and treatment outcome"

Instituição/*Institution*: University Medical Centre UKE – Hamburg Eppendorf, Centre of Psychosocial Medicine, University Clinic of Psychiatry and Psychotherapy, Department for Anxiety Disorders, Hamburg - Germany

Duração prevista/*Estimated duration*: 2009/01 - 2010/04

Investigadores/*Researchers*: Dr. Agorastos Agorastos e Prof. Steffen Moritz, Prof. Michael Kellner, Dr. Christoph Muhtz

Objectives: Religion is a complex human universality, affecting many different parameters of human thinking and behaviour, suggested to also play a major role with respect to physical and mental human health. Although the relationship between religiosity/spirituality (R/S) and mental health has been extensively studied in general in the last two decades and underlined by many biological studies, a literature review shows that the relation of anxiety disorders to R/S is less investigated, than in other psychiatric disorders. Nevertheless religion has often been thought to play some role in the genesis of obsessive–compulsive disorder. At last there are many findings supporting the thesis that beside R/S, magical ideation (MI) and paranormal beliefs (PB) can also have an influence on psychiatric disorders and especially anxiety and OCD, while R/S seems to also have a special relationship to magical ideation and paranormal beliefs.
The objective of the study is to investigate the relation of R/S, MI and PB to each other and to anxiety disorders in general and OCD in particular. The primary aim is to determine resilience and risk factors for the pathogenesis and treatment outcome of anxiety and obsessive-compulsive symptoms.

Methods: The study sample included unselected inpatient and outpatient patients with OCD and other anxiety disorders, recruited the Department for Anxiety Spectrum Disorders of the Clinic for Psychiatry and Psychotherapy in the University Medical Centre Hamburg-Eppendorf, Germany.
Patients have been equally interviewed and assessed by self-report measures at admission and discharge. All results were compared between two groups and in contrast to a control group of healthy individuals without history of mental illness. Variables of R/S, MI and PB will be analyzed with respect to anxiety and ocd scores, as well as to treatment outcome.

Results: Preliminary results of the project will be presented.

Conclusions: The studied parameters are far more multidimensional as thought so far and their relation to ocd and anxiety disorders is analogically complex but interesting. Plausibility of findings and implications for psychotherapeutical treatment are discussed.

Keywords: Religiosity, magical ideation, paranormal beliefs, anxiety, ocd.

96/08 - "Brain Activity During PK and Facial Recognition Tasks – Research with near Infrared Spectroscopy"

Instituição/*Institution*: Bio-Emission Laboratory, International Research Institute (IRI), Chiba - Japan

Duração prevista/*Estimated duration*: 2009/01 - 2010/02

Investigadores/*Researchers*: Dr. Mikio Yamamoto, Dr. Hideyuki Kokubo

Abstract: The authors tested a famous Chinese psychic (female, 40 years old) during psychokinesis tasks "teleportation". Targets were vitamin pills on an electric balance or in a bottle. The subject tried to teleport the pills in free style tests for 30-45 min. During the tasks, her brain blood flow was measured by functional near infrared spectroscopy (fNIRS), and also respiration, electrodermal activity and photoplethysmograms were measured. Pill weights were measured with an analytical semi-micro balance every second at 0.01 mg accuracy. Video cameras, field RNGs, a thermograph, field IR sensors and an electrostatic voltmeter were set near the balance. The subject was given a profile questionnaire and 5 questionnaires on character traits such as Big Five test. The Uchida-Kraepelin Psychodiagnostic test was also done. Moreover, to allow comparison to other studies, the subject was given a facial recognition test using photos of a young Japanese woman's face as stimuli. No teleportation phenomena were observed. Brain blood flow increased at the subject's right cerebral hemisphere during the tasks. Activated areas were similar to those during facial recognition tests. Only one of the field RNGs showed a significant deviation during the experimental period. Electrostatic voltmeter measurements suggested that the electric charge of her body was disturbed slightly during tasks. Based on her results of psychological tests, the subject's personality was evaluated as ordinary, and not special.

Publication:

1. Hideyuki KOKUBO, Mikio YAMAMOTO, Takako USUI and Hideo YOICHI, Brain Blood Flow during Psychokinesis Tasks - Biophysical and Psychophysiological Study on a Psychic -, Journal of Interenational Society of Life Information Science, Vol.26, No.2, pp.223-234, 2008.

Keywords: brain blood flow, fNIRS, psychokinesis, teleportation, facial recognition, electrostatic, personality, Uchida-Kraepelin test, Big Five test, psychic

167/08 - "Testing the ontological status of the experience of meditation-induced timeless states" - only abstract available

Instituição/*Institution*: Institute of Noetic Sciences, Petaluma, California - USA
Duração prevista/*Estimated duration*: 2009/01 - 2010/01
Investigadores/*Researchers*: Dr. Cassandra Vieten, Dr. Dean Radin, Dr. Marilyn Schlitz

The world's spiritual and religious literature abounds with descriptions of mystical states of consciousness in which perceptions of the boundaries between a separate subject (the self) and object (the other) dissolve. Recent scholarship on these states, by psychologists in collaboration with spiritual practitioners and leaders, have dubbed this type of awareness "nondual," to reflect the perceived lack of separation between subject and object. During these states, experiencers often report that their sense of three-dimensional space and linear time shifts.

Objectives: The overall aim of this project is to investigate neurobiological correlates of nondual states of awareness, and to explore whether perceptions of timelessness are illusions that have a purely subjective impact on those who experience them, or if they are genuinely enhanced levels of awareness that allow experiencers to perceive an ontologically accurate dimension of reality.

Methods: To investigate this we are monitoring physiological markers of non-dual states of awareness, and will correlate those markers with performance on an experimental task that provides an unconscious measure of perceptual awareness through time (i.e., a presentiment test). Experienced practitioners of nondual awareness teachings and practices are being compared with matched controls who have had no experience with meditation. EEG frequencies and evoked potentials are being compared 1) in advanced practitioners who are in non-dual states of awareness vs. active control and rest periods, and 2) with non-meditators between periods of imagining such states of consciousness and active control and rest periods. The project will shed light on the neurobiological underpinnings of nondual states of awareness, as well as examining whether these states enhance implicit precognition.

Results, Conclusions and Publications: Data collection is currently underway. There are no conclusions or publications to date.

Keywords: nondual, precognition, meditation, EEG

179/08 - "Percepção Extra-sensorial: um estudo acerca da possibilidade de visão heteroscópica" - "Extra-sensorial perception: a study on the possibility of heteroscopic vision"

Instituição/*Institution*: HUB – Hospital Universitário de Brasília e NEFP – Núcleo de Estudos dos Fenômenos Paranormais, Brasília - Brazil

Duração prevista/*Estimated duration*: 2009/01 - 2010/03

Investigadores/*Researchers*: Prof. Álvaro Luiz Tronconi, Prof. Moema da Silva Borges, Dr. Joel Paulo Russomano Veiga, D. Cleunice de Arruda Castro, Dr. Eloina Terezinha Domanski, D. Walkyria Eyre

Objectives: To evaluate the possibility of human capability to formulate diagnostic hypotheses through extra-sensory perception, such as Heteroscopic Vision- HV

Methodology: Six research subjects formulated 200 diagnostics of 87 patients of the Hospital Universitário de Brasilia-HUB. Sixty-two of the diagnostics were non-presential, performed by 4 sensitives non-residents in Brasilia, through picture, name and date of birth of the patients. Descriptive statistical method is being used to evaluate the data.

Data Collection: It took place at an office at the HUB. The sensitive formulated a diagnostic hypothesis and filled out a form containing the patient´s name, age and belief on the possibility of HV. Time allowed: 10 min. Each diagnostic hypothesis was then sealed in an envelope that was signed by the research team and kept at a safe and inviolable place. At the end of the data collection they were made available for data evaluation. The diagnostic hypotheses are being confronted with the clinical and laboratory diagnoses on the patients´ charts.

Results: We expect to obtain answers regarding: quantity and quality of correct diagnostic hypotheses on each day of collection data; if any remarkable fact that might have occurred to the sensitive during the formulation of the diagnostic hypothesis affected the quality of the results; if each sensitive have preferably formulated hypotheses related to a specific group of diseases; correlation between patient´s age group and correct diagnosis; correlation between patient´s gender and correct diagnosis; correlation between patient´s belief on the possibility of HV and correct diagnosis; if the quantity and quality of correct diagnoses formulated by more than one sensitive about the same patient were the same; correlation between specific pathologies and correct diagnoses; evidence of cold reading; if the average number of correct diagnoses varied among the sensitives; if the results showed possible existence of a human capability to formulate a diagnosis not based on anamnesis.

Keywords: extra-sensory perception; sensitivity; cold reading; heteroscopic vision

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