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Institute of Cognitive Neurology (INECO)

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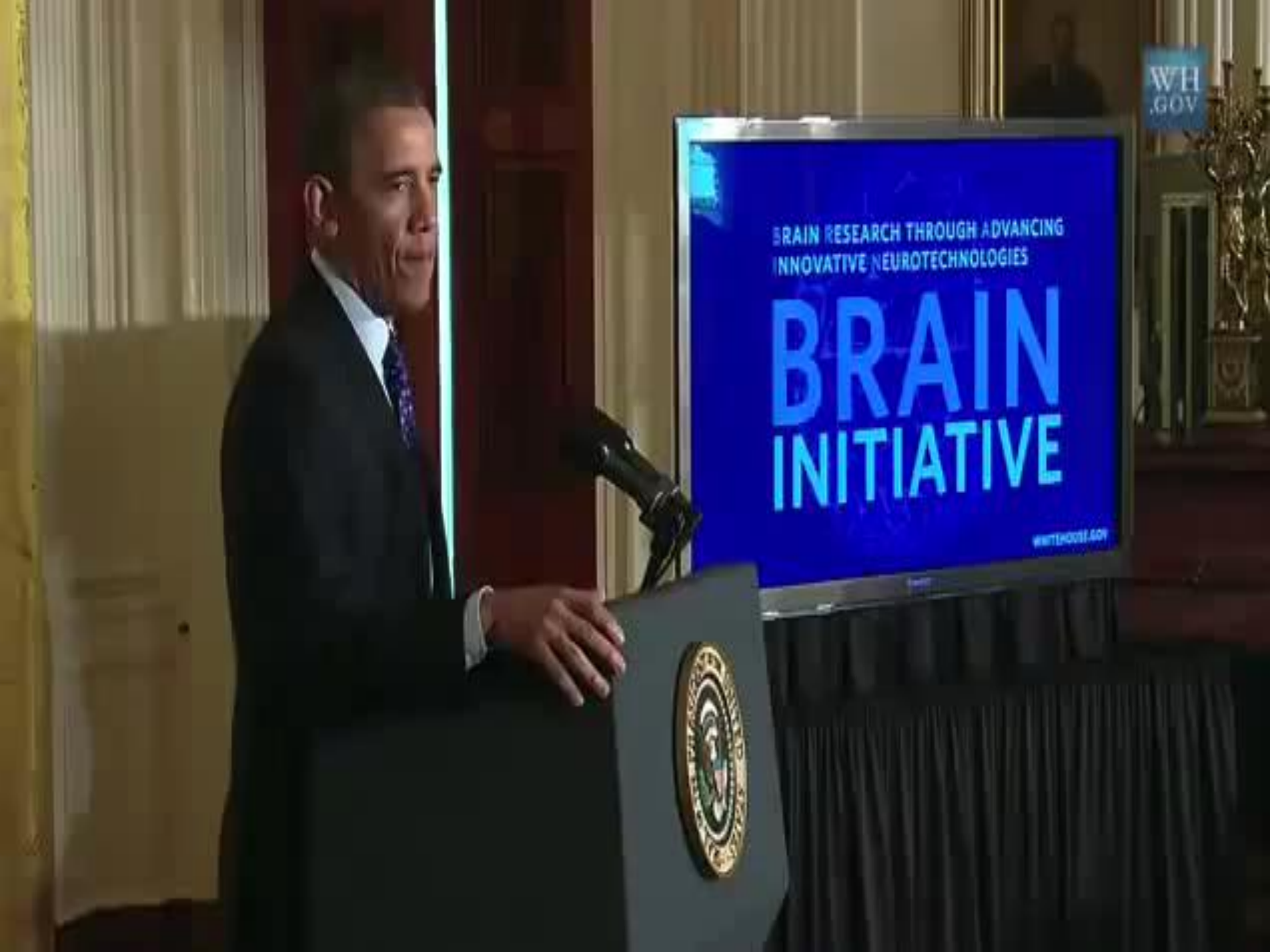
Buenos Aires, Argentina


WH
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BRAIN RESEARCH THROUGH ADVANCING
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BRAIN
INITIATIVE

Interfaz cerebro-máquina

Cerebros conectados

Direct Brain-to-Brain Communication in Humans: A Pilot Study

August 12, 2013

Neural Systems Laboratory (NSL)

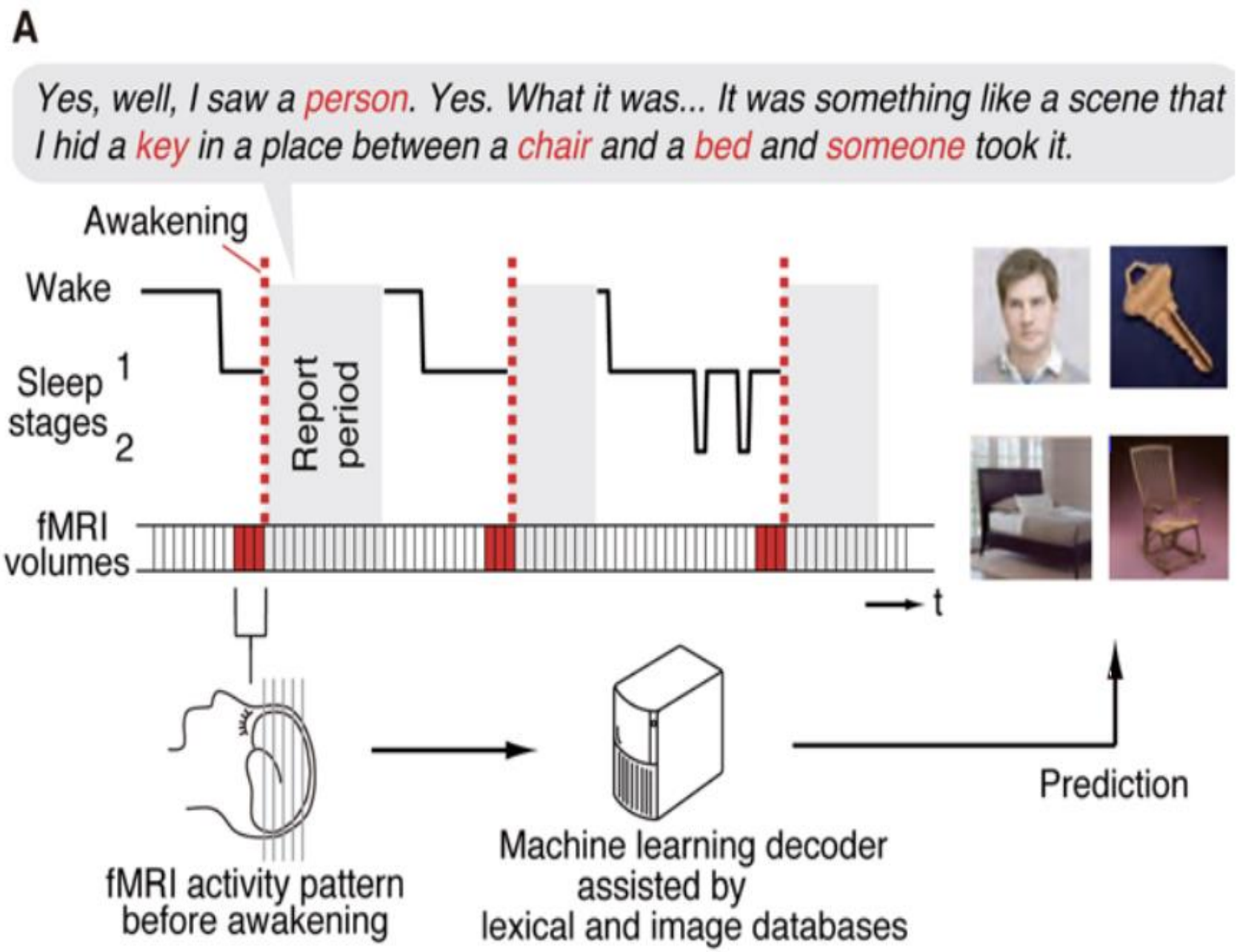
Department of Computer Science and Engineering

Cognition & Cortical Dynamics Laboratory (CCDL)

Institute for Learning and Brain Sciences (ILABS)

University of Washington, Seattle, USA

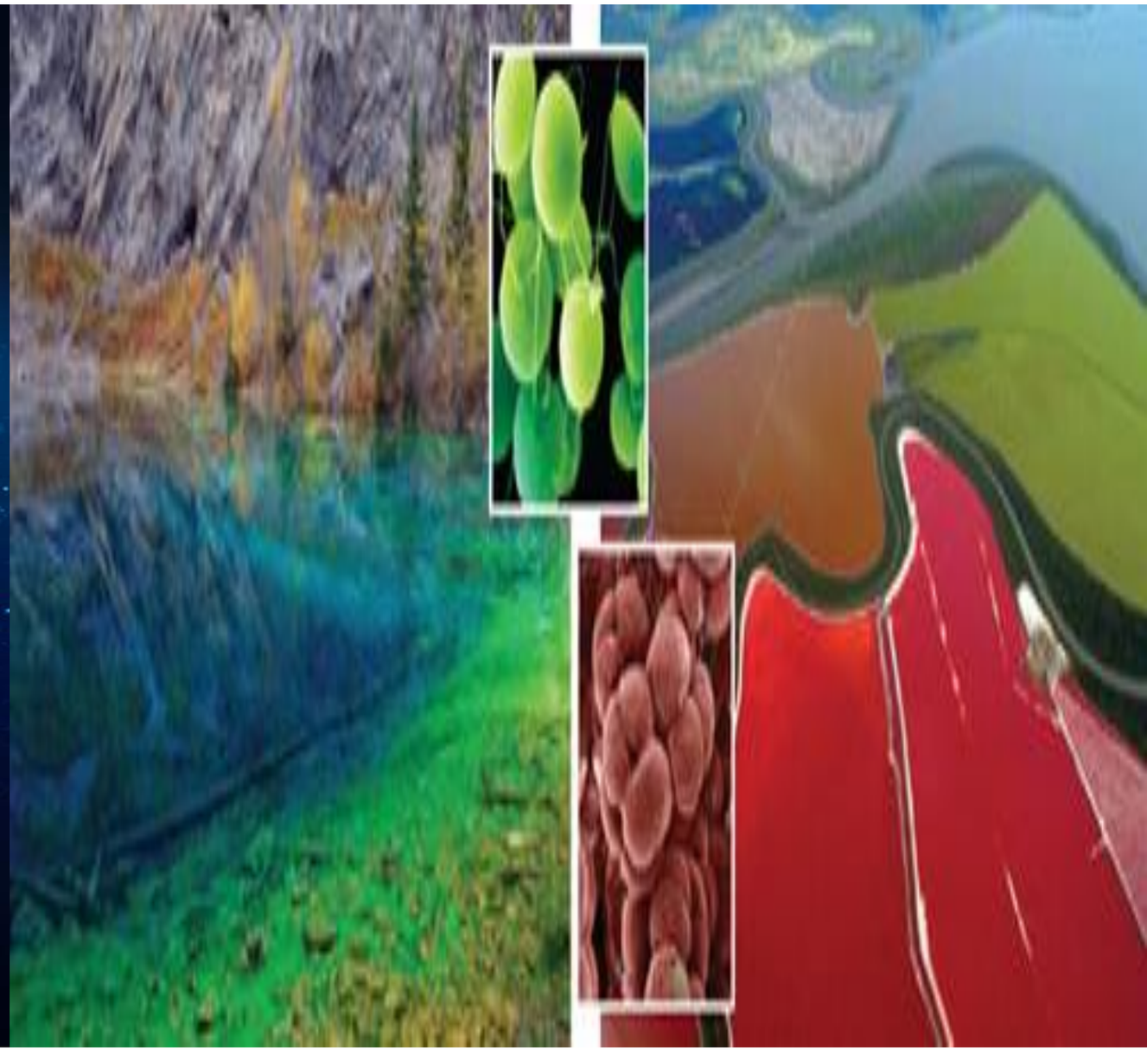
Exploración de los pensamientos y sueños



Aterrizando con los pensamientos

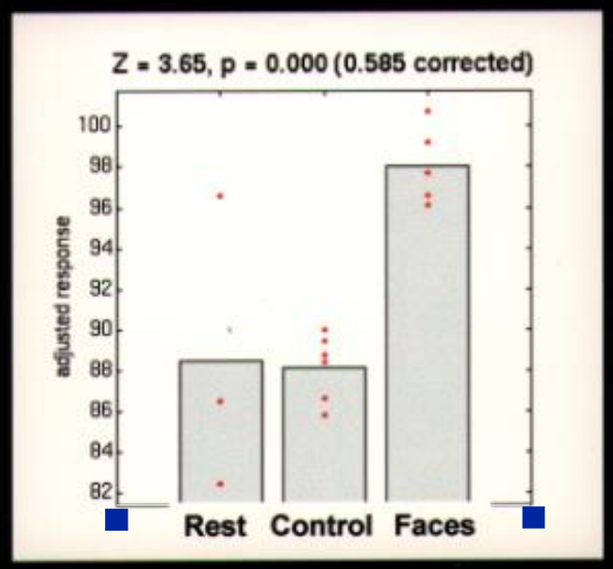
Las neuroimágenes modernas han permitido a investigadores reconstruir imágenes de las caras que una persona ha visto

Tiny solar panels embedded in neurons—are now facts of life

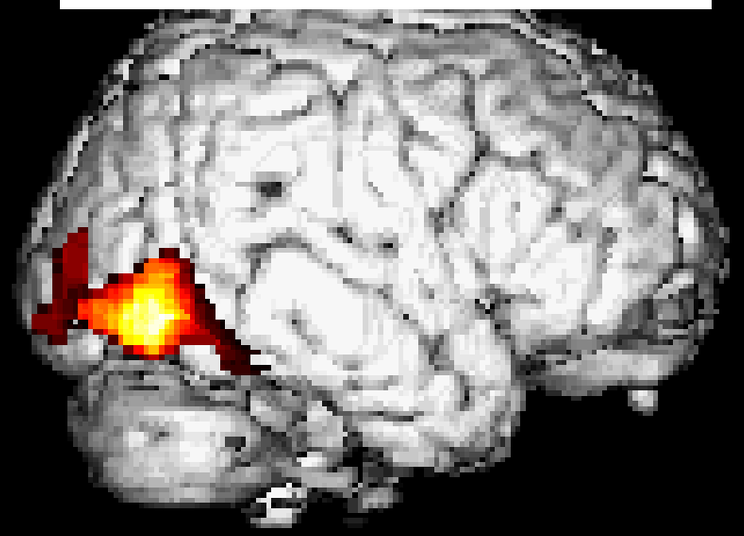


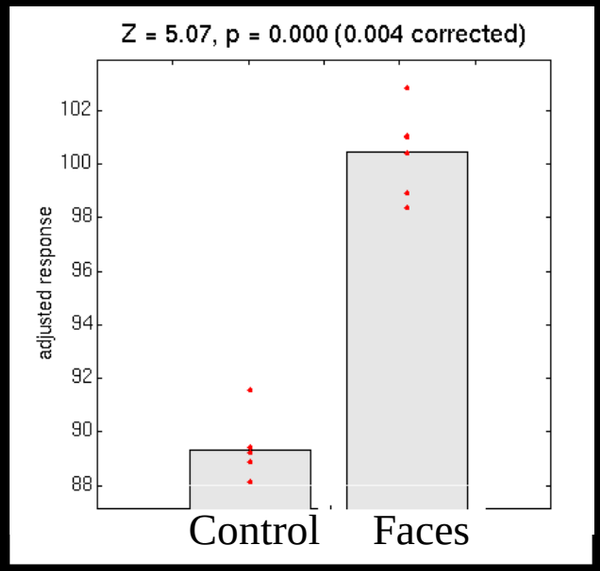
JANUARY 1997

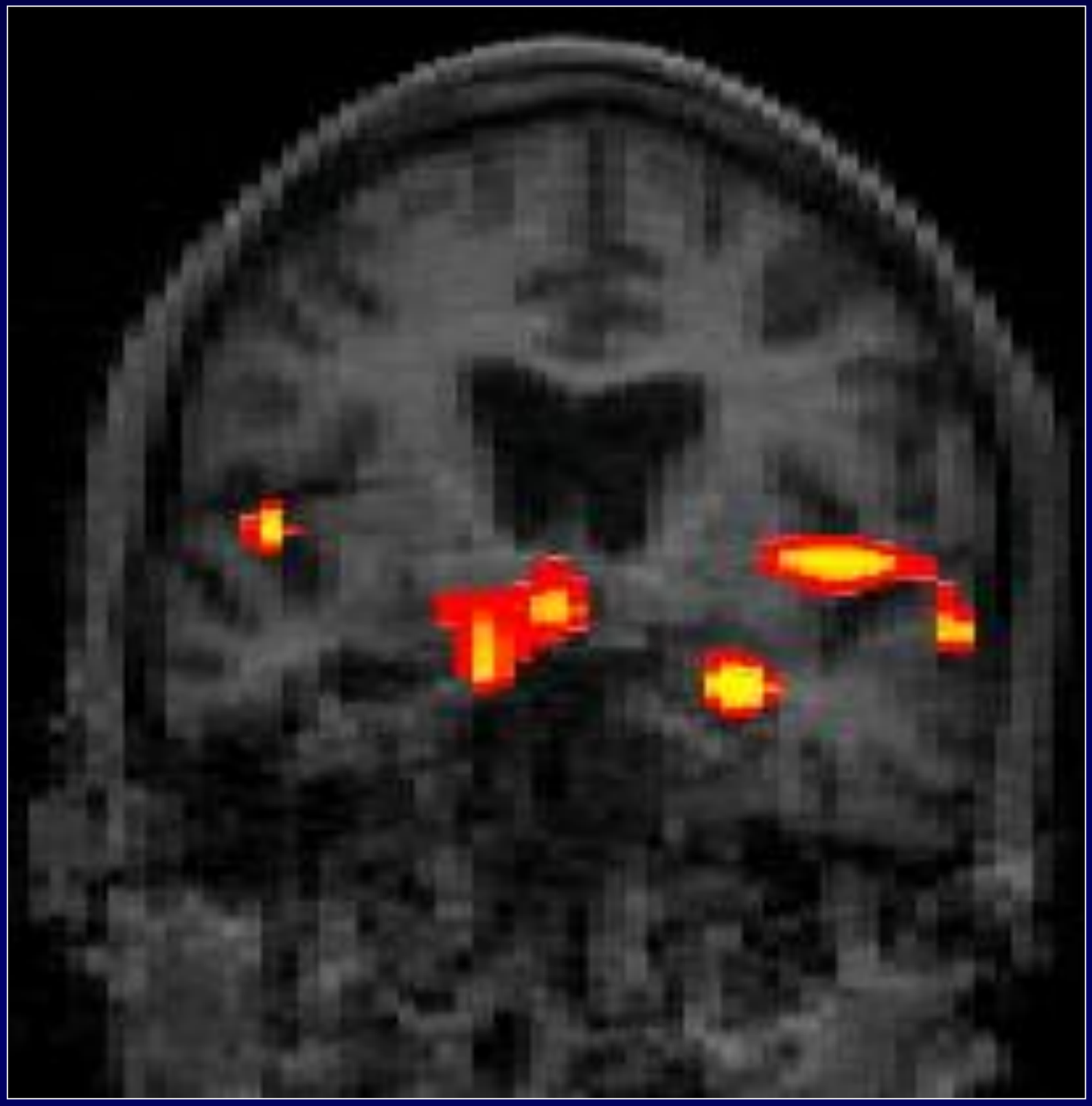
PVS Patient



Healthy Volunteer

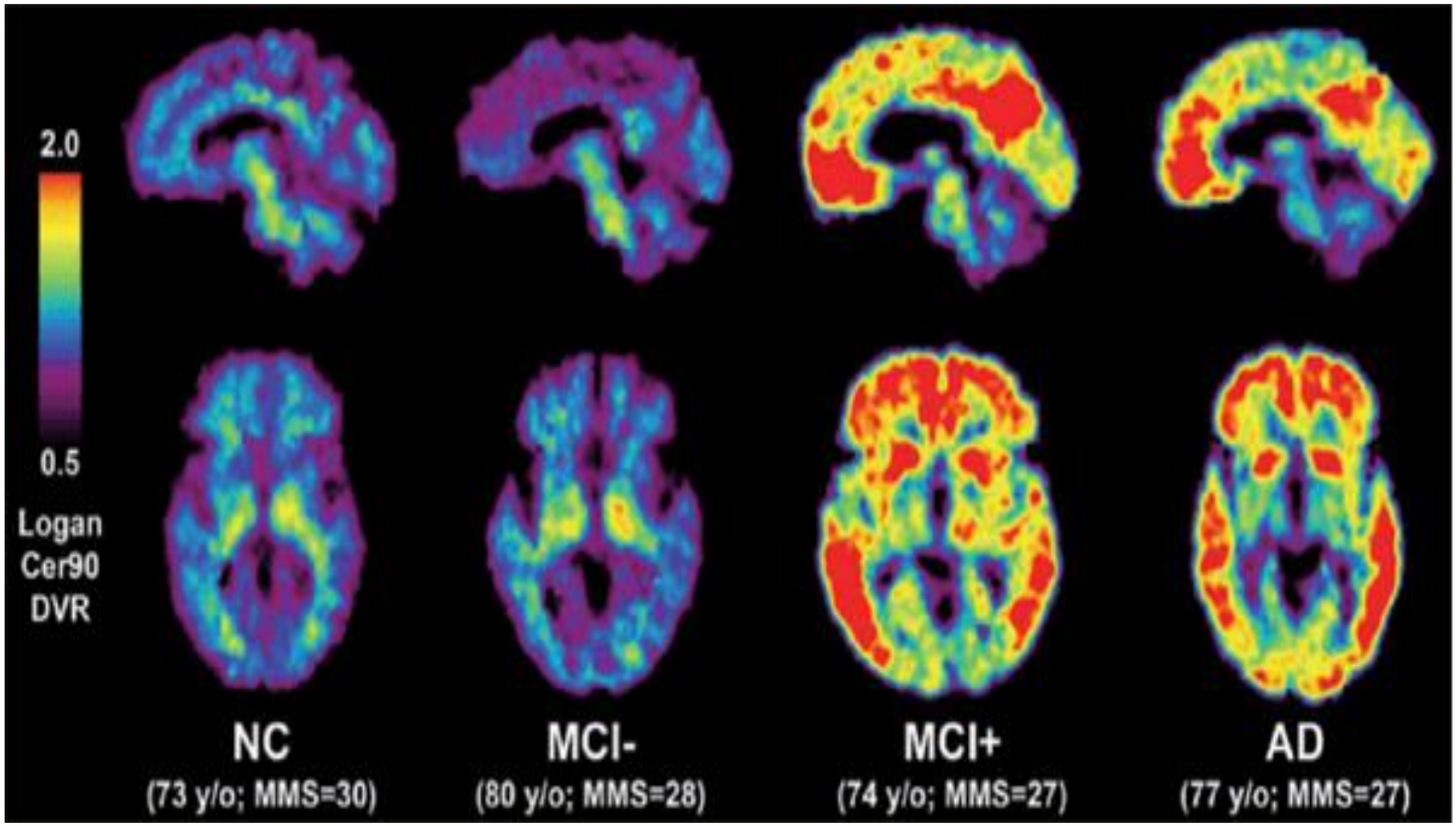






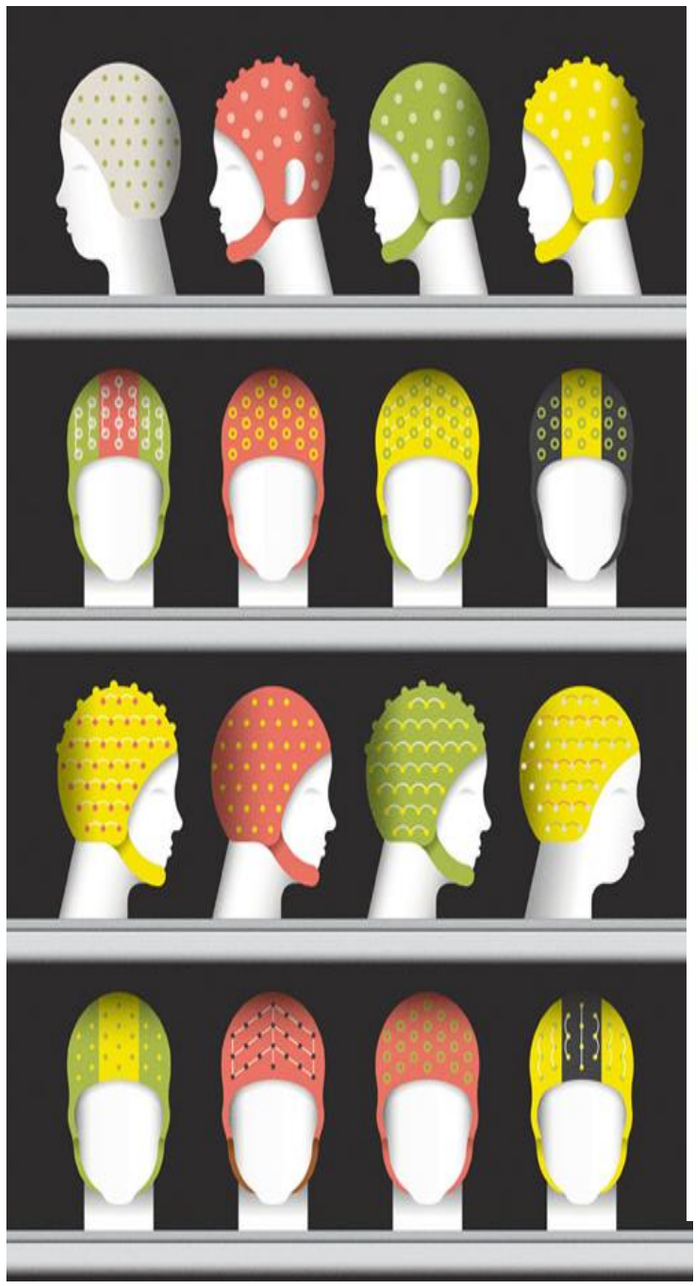
Brain areas of activation produced by mother’s voice subtracted from non-familiar voice in coronal view

La nueva tecnología abre nuevas fronteras en la salud mental: biomarcadores



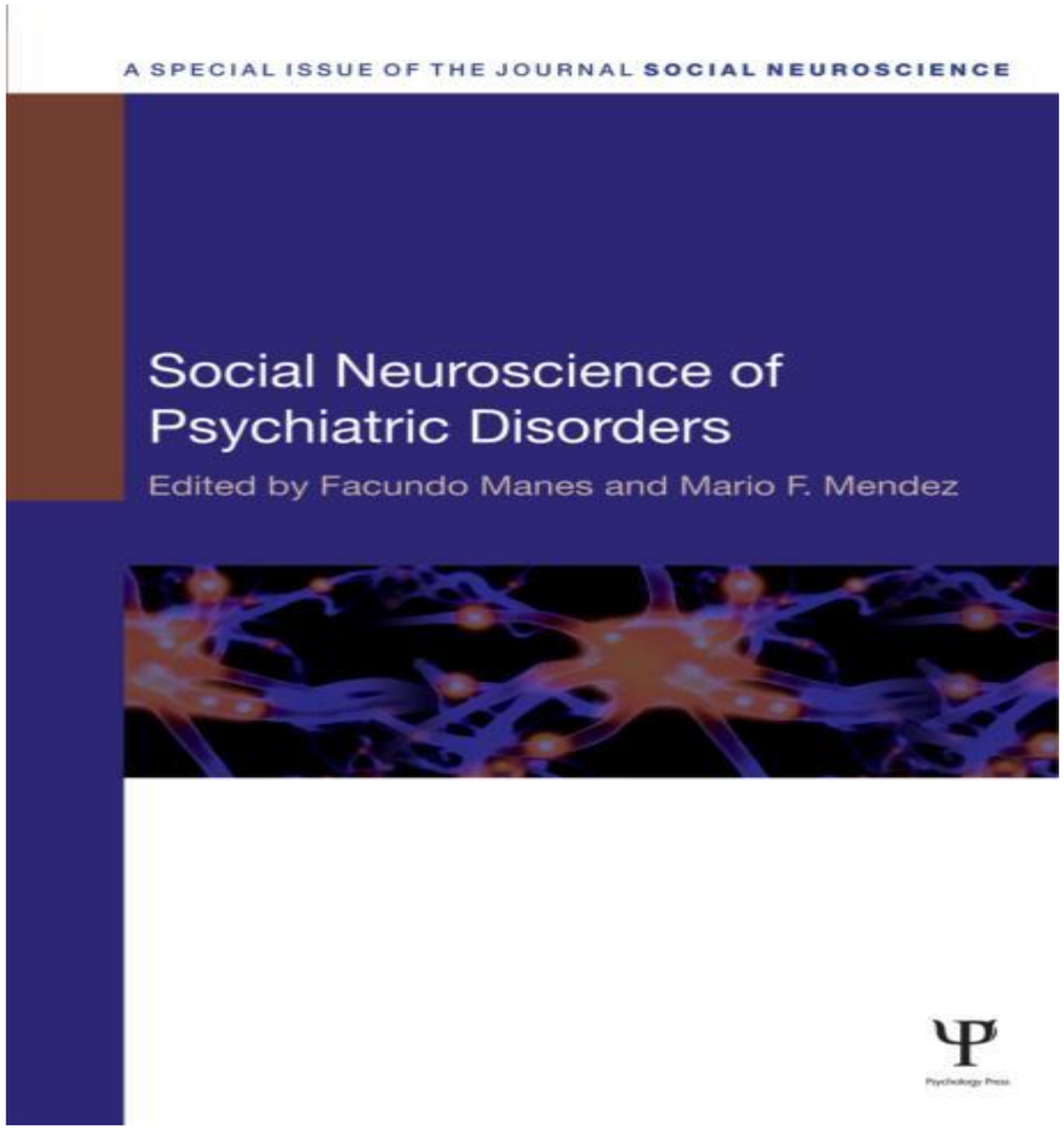
PET Cerebral con marcador Pib –Tomografía Computada por Emisión de Positrones con biomarcador PiB (Carbono 11)

2010: Inicio Colaboración Universidad de Antioquia- Banner




CAPUTRON UNIVERSAL STRAP

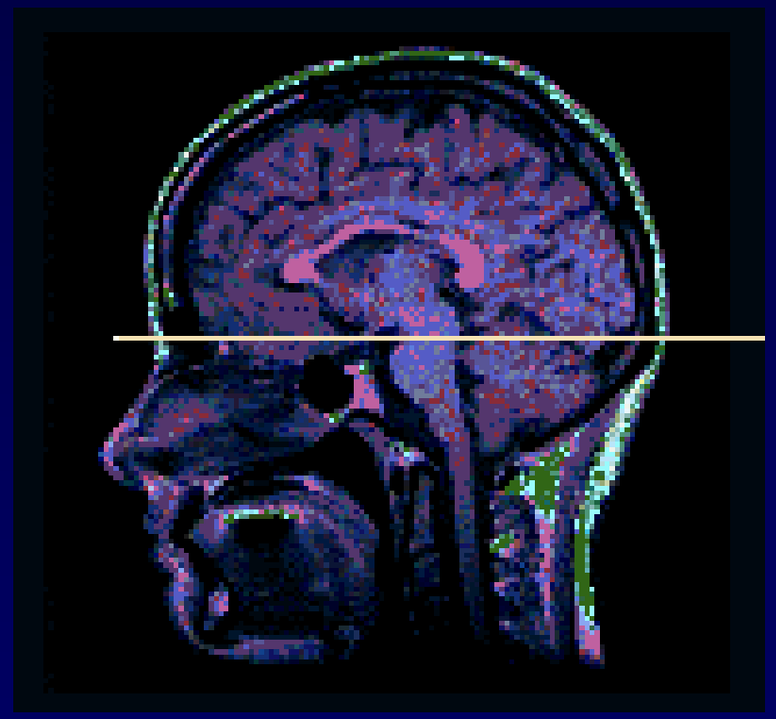
Aristóteles



Neurologic and psychiatric research are moving closer together in the tools they use, the questions they ask, and the theoretical frameworks they employ. The interests of neurology and psychiatry converge within the framework of modern neuroscience. ***(Am J Psychiatry 2002; 159:695–704)***

Social Cognition

- Social Cognition: Any cognitive process that involves other people

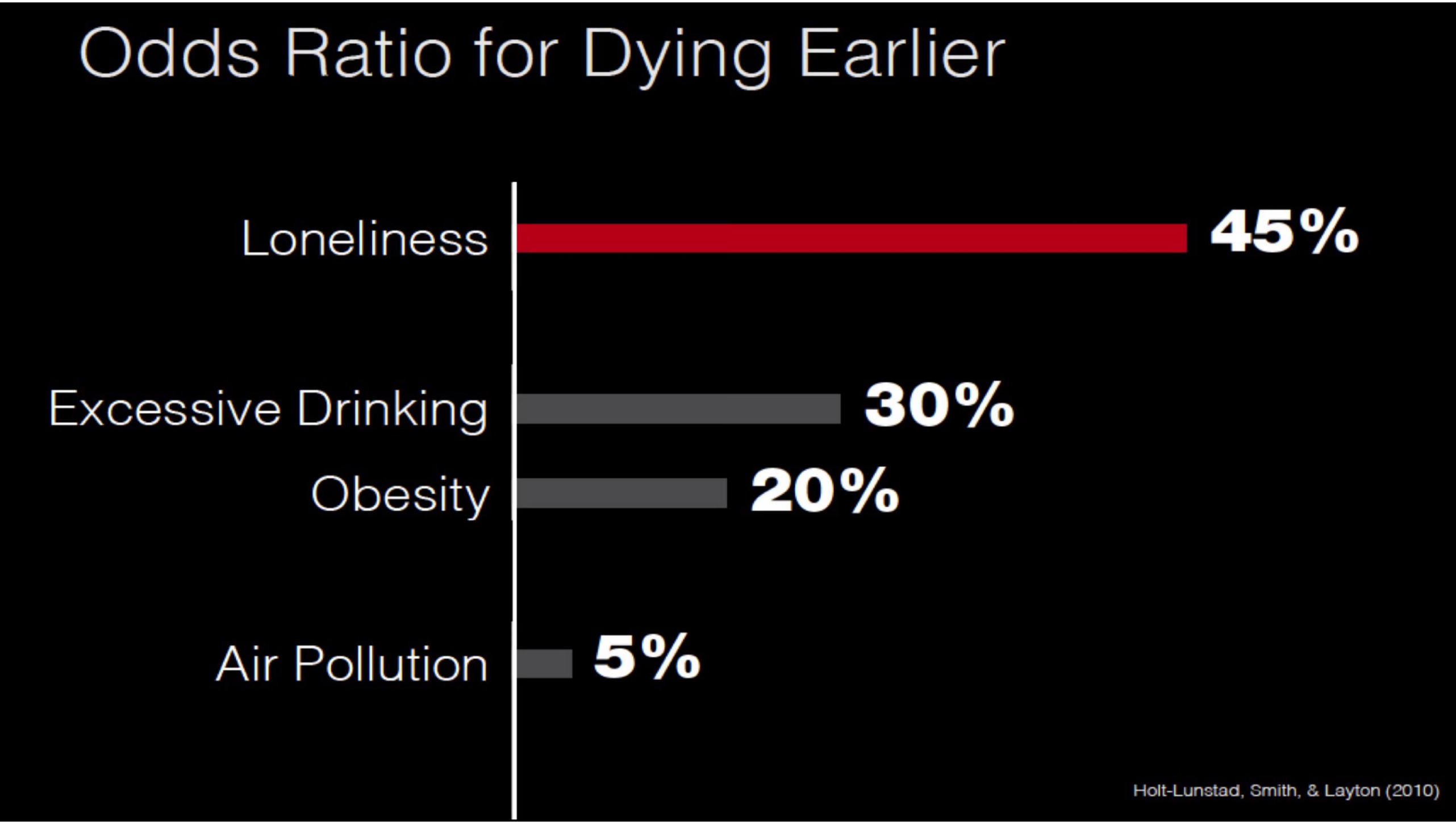


today

40%

feel lonely at any given time

Odds Ratio for Dying Earlier



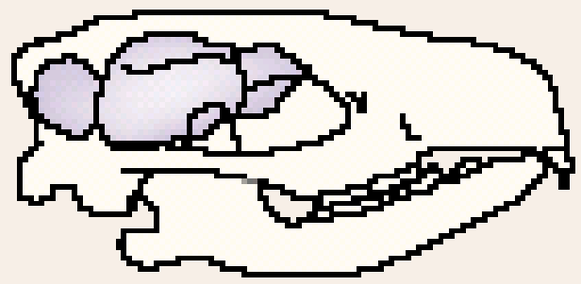
Holt-Lunstad, Smith, & Layton (2010)

Box 1 | Are our brains specialized for social cognition?

Brains and social behaviours vary across different mammalian species. Primitive insectivores (for example, hedgehogs) already show tightly regulated maternal behaviours that allow extended development of their offspring; non-human primates (for example, chimpanzees) live in extended societies of a few dozen subjects; and modern humans have created societies that encompass millions of interacting people.

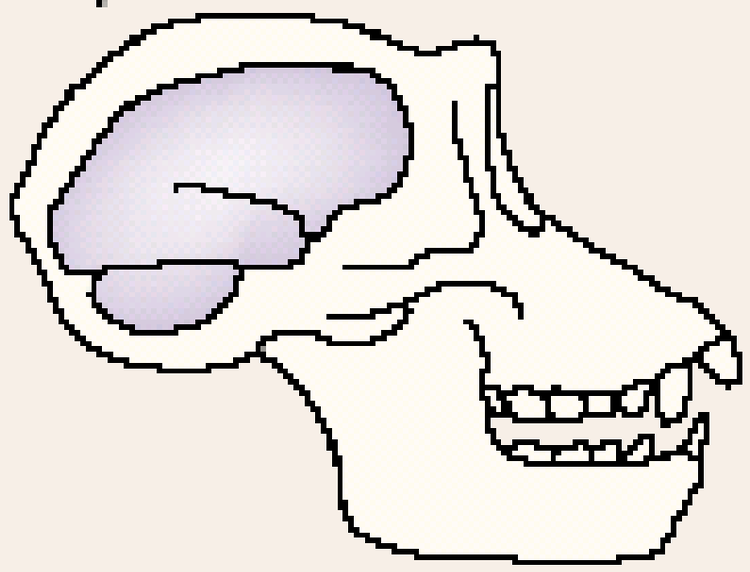
There is no question that humans are exceedingly skilled at large-scale social interaction, but it remains a puzzle how best to account for such abilities. Under one hypothesis[140], the competition for social skills led to the evolution of cognitive mechanisms for outsmarting others[150], and fuelled the expansion of the human brain and perhaps the elaboration of certain neural systems[151]. In support of this idea, there is a correlation across primate species between the size of their social group and the relative volume of neocortex[149].

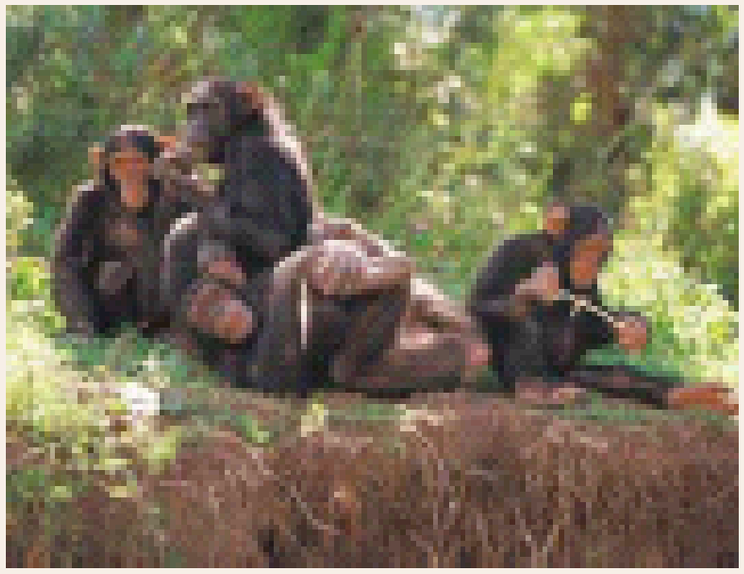
Hedgehog



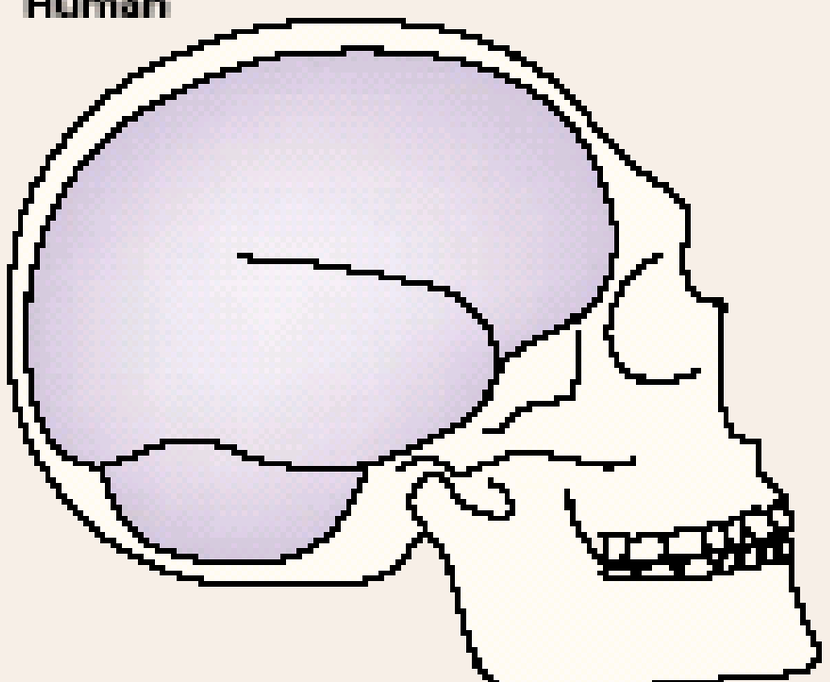
Courtesy of Laura Roberts

Chimpanzee

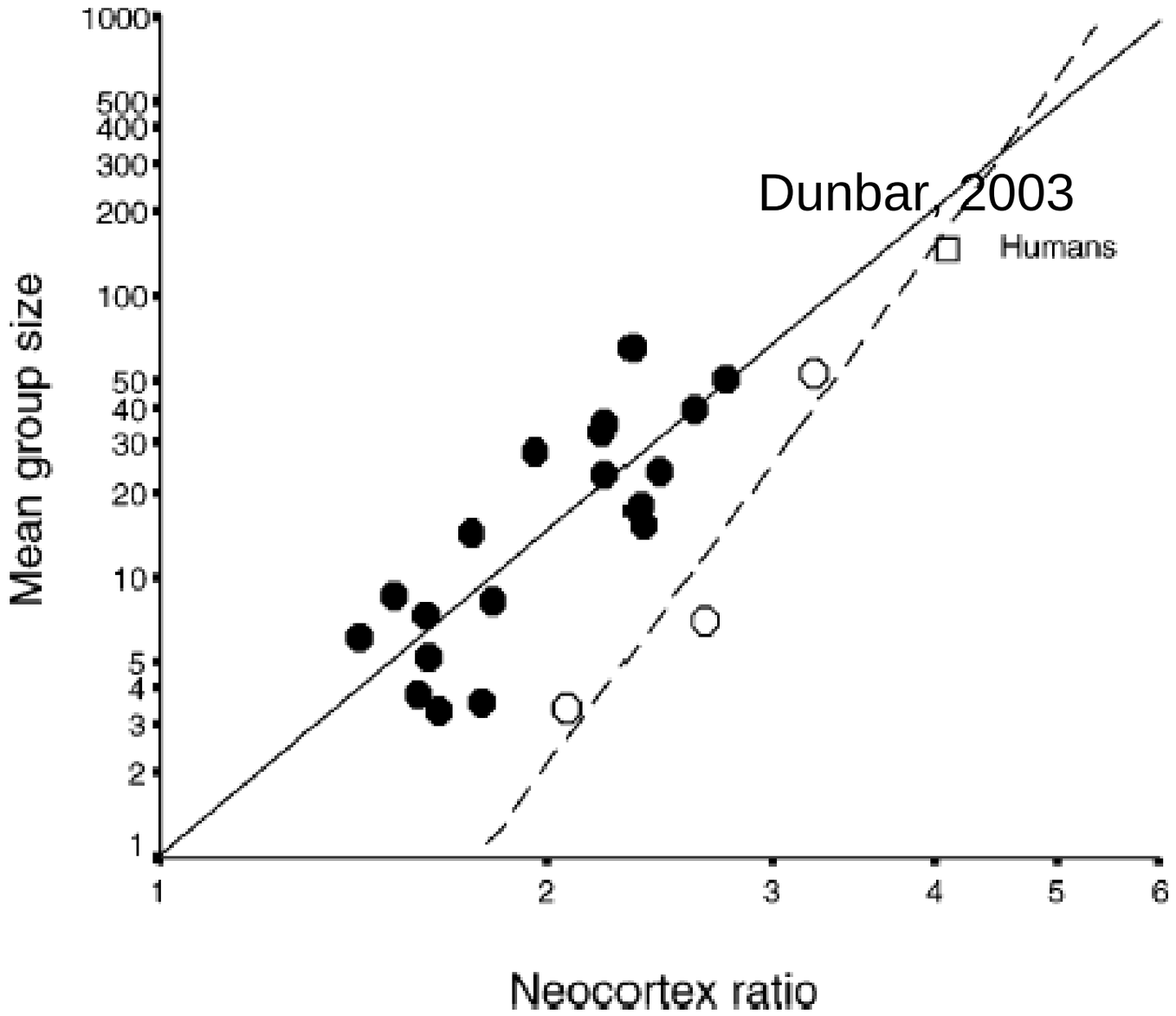




Human



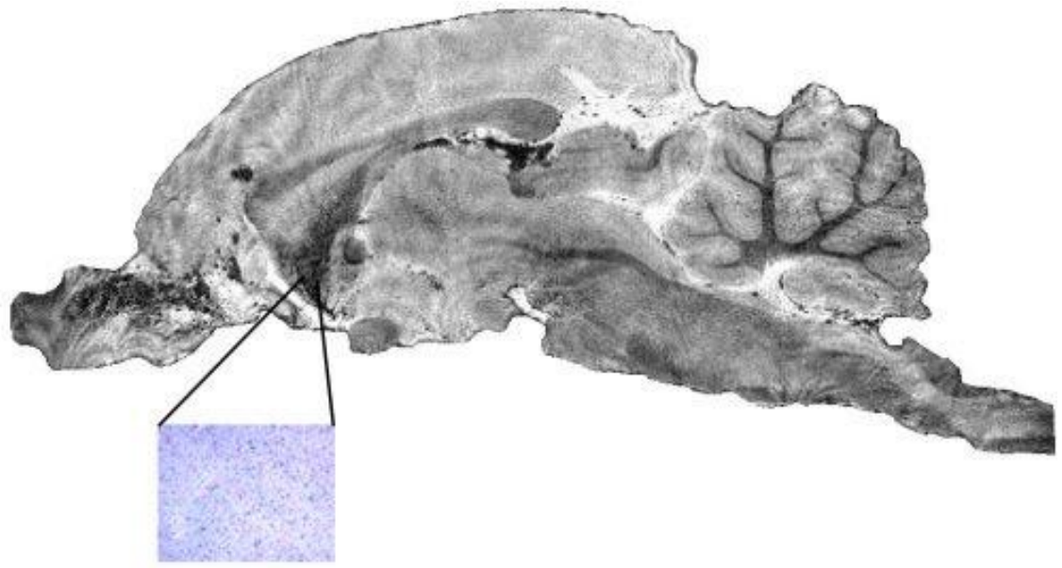
Social Brain Hypotesis

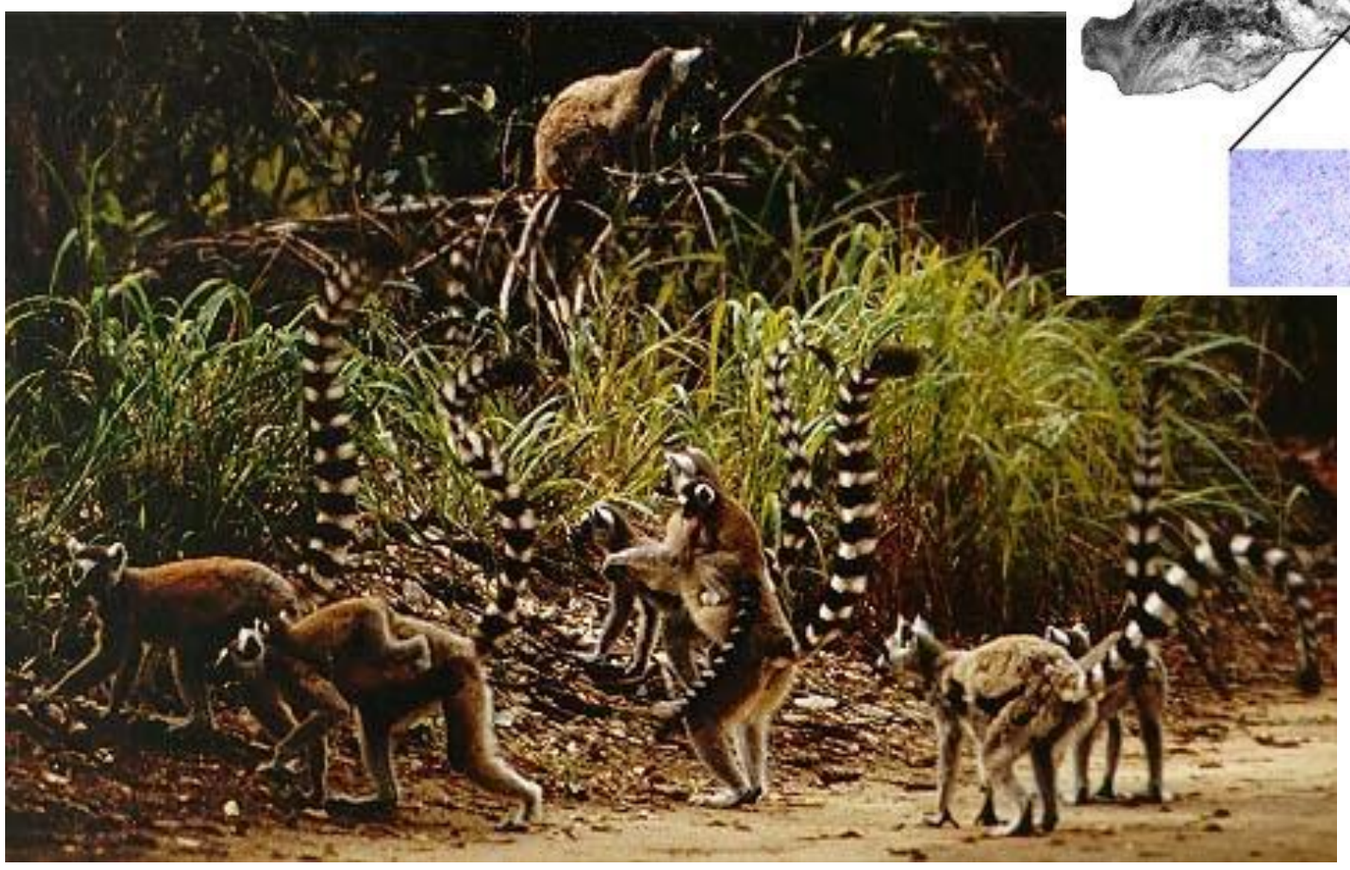


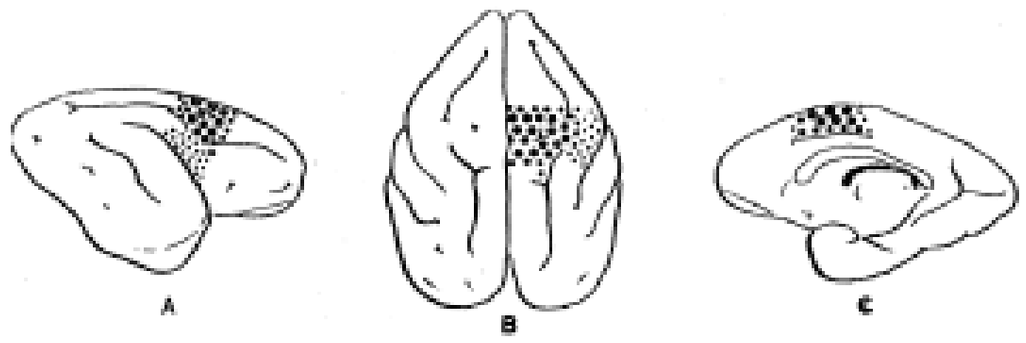
The Chance-Mead-Jolly-Kummer-Humphrey hypothesis

Jolly (1966) :

“lemurs are social but small brained. Dominance hierarchies yes but little evidence of male “alliances” - big brains follow from selective pressures of social living?…”







Diagrams A, B, and C are drawings of the outer and mesial surfaces of one hemisphere (A and C), and a drawing of the cerebrum as seen from above (B). The dotted area is the portion characterised by the possession of Betz cells, the size of which is roughly indicated by the size of the dots.

Byrne & Corp (2004). Neocortex size predicts deception rate in primates. *Proc R Soc Lond B*, 271, 1693-1699.

Predominio del engaño táctico sobre la dimensión de grupo en el tamaño del neocortex

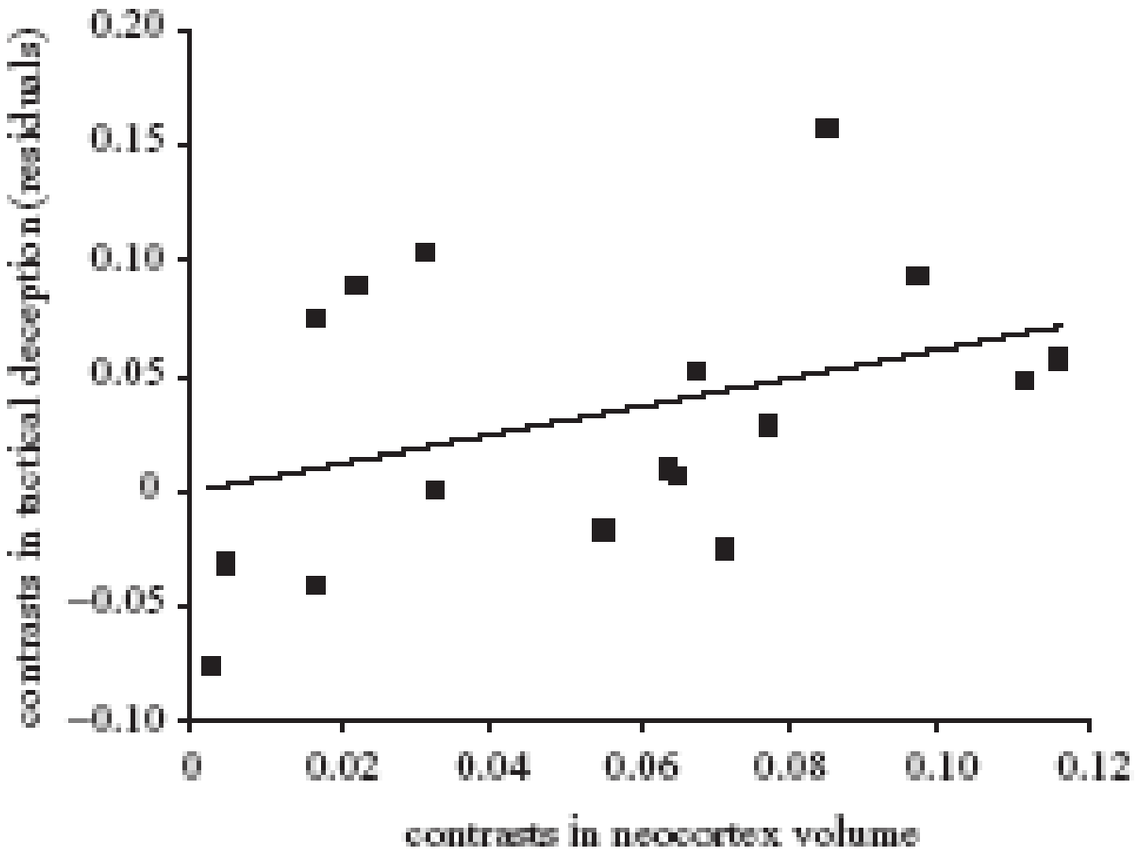
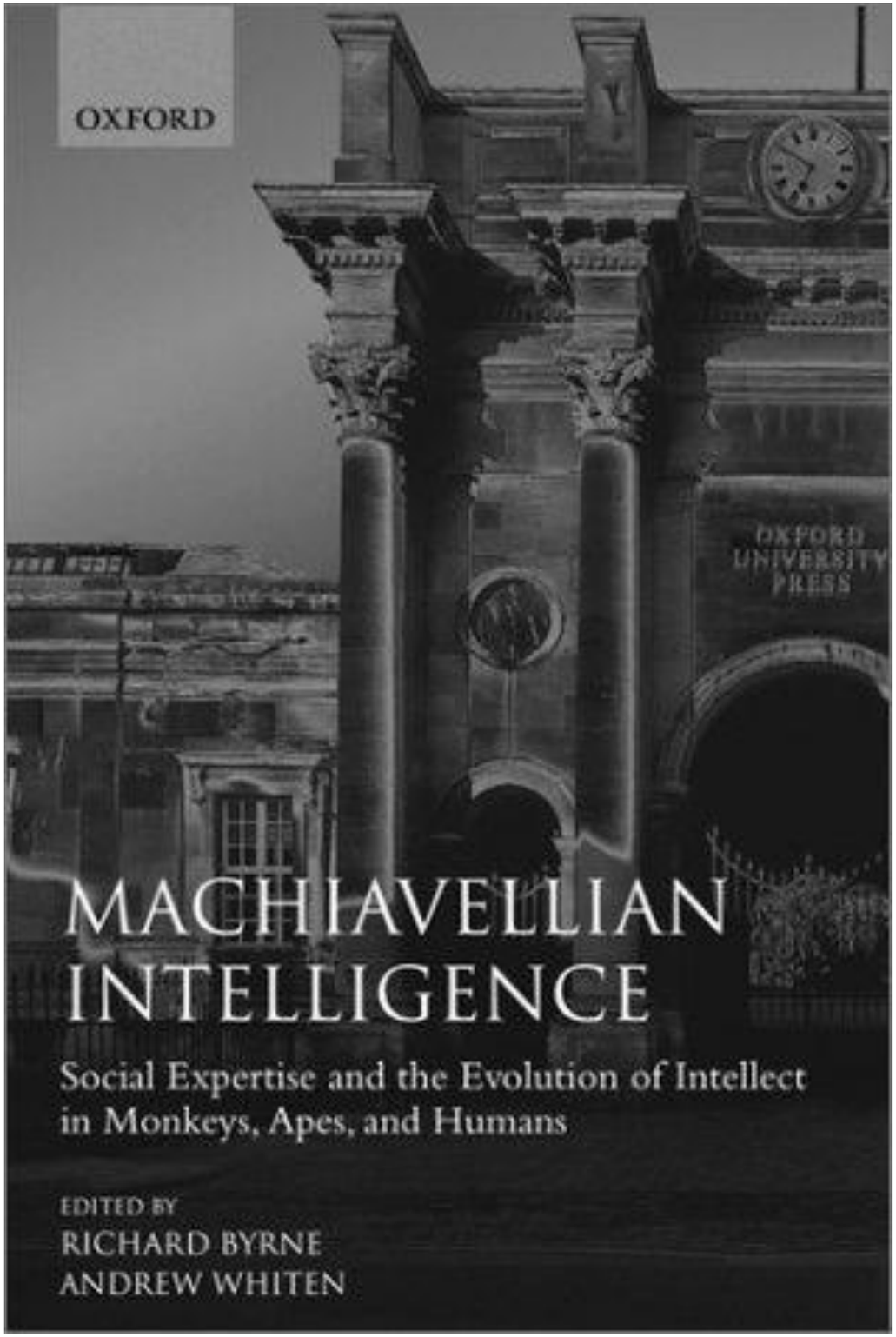
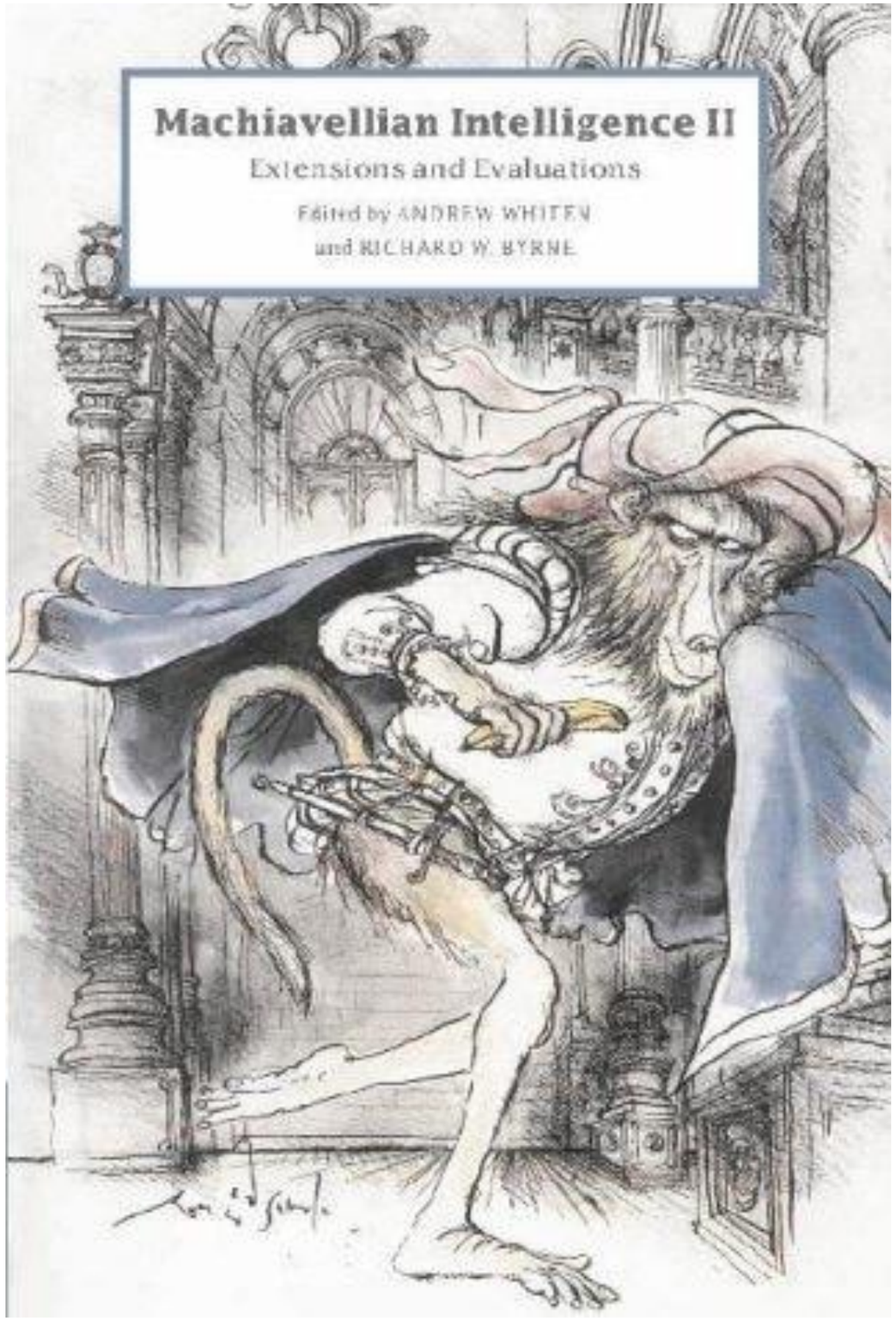


Figure 1. Correlation between deception usage and volume of the neocortex in primates. Independent contrasts were used to avoid a taxonomic bias. The frequency of within-group tactical deception was corrected for bias in observation effort, by using the residuals of the regression of deception against the number of studies.


OXFORD
OXFORD UNIVERSITY PRESS
MACHIAVELLIAN INTELLIGENCE
Social Expertise and the Evolution of Intellect in Monkeys, Apes, and Humans
EDITED BY
RICHARD BYRNE
ANDREW WHITEN

(1988)


Machiavellian Intelligence II
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and RICHARD W. BYRNE

(1997)

Methodological Issues

- Neuropsychology and pschopatology
- Behavioral measures
- Peripheral measures
- EEG/ERPs
- Intracranial recordings
- Lesions
- fMRI tasks
- Connectivity (EEG-fMRI)

Cognicion Social y Neurociencia Social

- Toma de Decisiones (TD)
- Teoría de la Mente (ToM)
- Violación de normas sociales
- Procesamiento de las expresiones faciales
- Procesamiento de emociones
- Juicio Moral

frontiers in
HUMAN NEUROSCIENCE

ORIGINAL RESEARCH ARTICLE
published: xx October 2010
doi: 10.3389/fnhum.2010.00188

Early neural markers of implicit attitudes: N170 modulated by intergroup and evaluative contexts in IAT

Agustín Ibáñez[1,2,3,4], Ezequiel Gleichgerrcht[1], Esteban Hurtado[3,5], Ramiro González[3,5], Andrés Haye[5] and Facundo F. Manes[1,4]*

Figure 1
IAT Paradigm

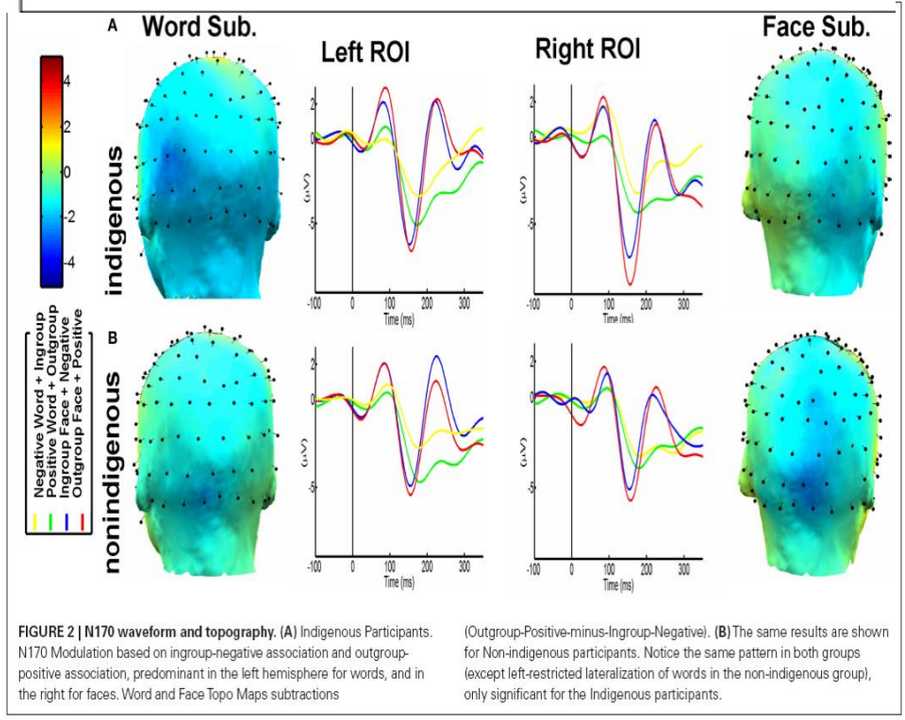

FIGURE 2 | N170 waveform and topography. **(A)** Indigenous Participants. N170 Modulation based on ingroup-negative association and outgroup-positive association, predominant in the left hemisphere for words, and in the right for faces. Word and Face Topo Maps subtractions (Outgroup-Positive-minus-Ingroup-Negative). **(B)** The same results are shown for Non-indigenous participants. Notice the same pattern in both groups (except left-restricted lateralization of words in the non-indigenous group), only significant for the Indigenous participants.

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Contextual blending of ingroup/outgroup face stimuli and word valence: LPP modulation and convergence of measures

nature REVIEWS NEUROLOGY

REVIEWS

Decision-making cognition in neurodegenerative diseases

Ezequiel Gleichgerrcht, Agustín Ibáñez, María Roca, Teresa Torralva and Facundo Manes

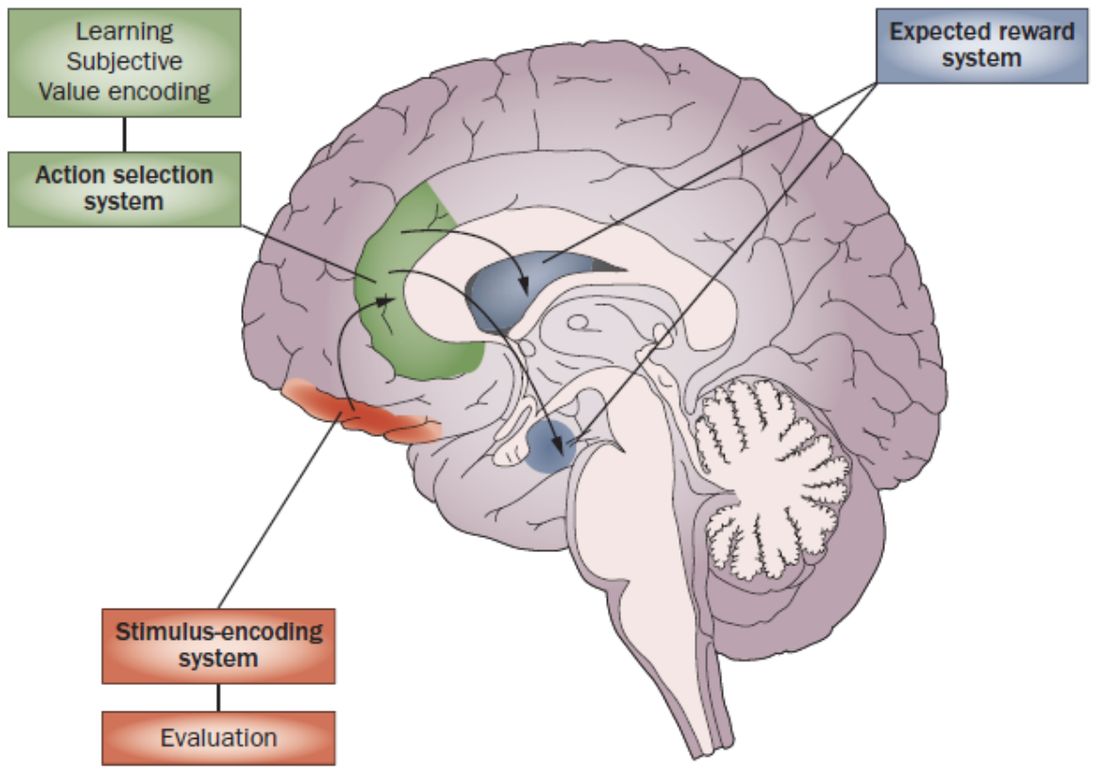

Figure 1 | A neuroanatomical model of decision-making. Three main systems are thought to be involved in decision-making: a stimulus encoding system (orbitofrontal cortex shown in red), an action selection system (anterior cingulate cortex shown in green) and an expected reward system (basal ganglia and amygdala shown in blue). Other brain areas that involved in decision-making include the ventromedial prefrontal cortex (stimulus encoding), the lateral prefrontal and parietal cortices (action selection), and the insula (expected reward).

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Neuropsychologia xxx (2006) xxx–xxx

NEUROPSYCHOLOGIA

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The relationship between affective decision-making and theory of mind in the frontal variant of fronto-temporal dementia

Teresa Torralva[a,b,1], Christopher M. Kipps[c], John R. Hodges[c,f], Luke Clark[d], Tristán Bekinschtein[a,1], María Roca[a,b,1], María Lujan Calcagno[e], Facundo Manes[a,b,*,1]

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[c] *Department of Clinical Neurosciences, Addenbrooke's Hospital, University of Cambridge, UK*
[d] *Department of Experimental Psychology, Downing Street, University of Cambridge, UK*
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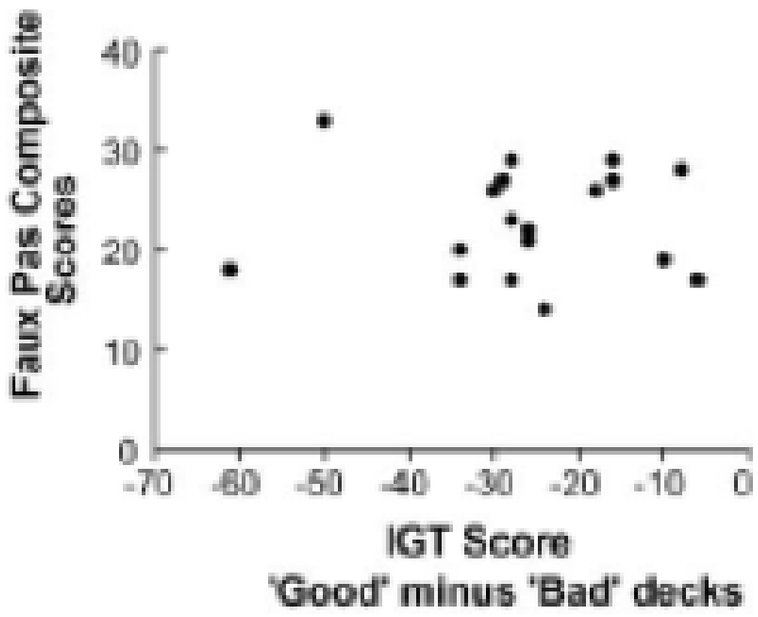
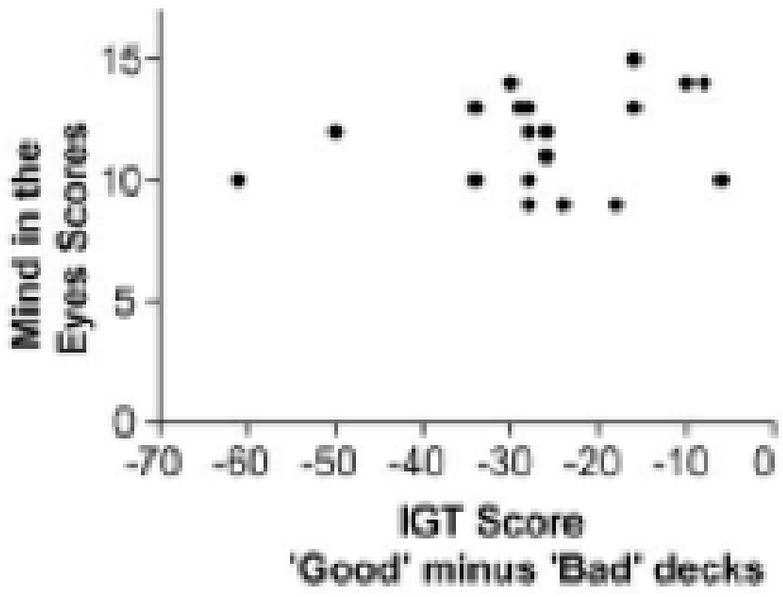
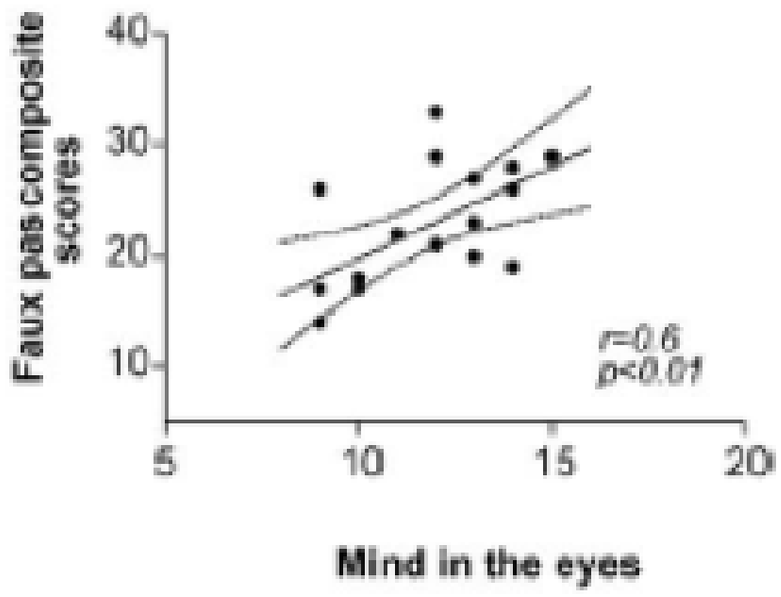
[f] *MRC-Cognition and Brain Sciences Unit, 15 Chaucer Rd, Cambridge, UK*

Received 15 August 2005; received in revised form 23 April 2006; accepted 28 May 2006







Theory of mind

The term theory of mind refers to the abilities to attribute mental states to others and to predict, describe and explain behaviour on the basis of such mental states (Baron Cohen, 1997).

Theory of Mind (ToM), a critical capacity for an appropriate social behaviour, is impaired in patients with bvFTD

(Eslinger et al., 2007; Funkiewiez et al., 2012; Gleichgerrcht et al., 2011; Gregory et al., 2002; Loughet al., 2006; Snowden et al., 2003; Torralva et al., 2007, 2009).

SOCIAL NEUROSCIENCE, 2010, *iFirst*, 1–10

Psychology Press
Taylor & Francis Group

The role of social cognition in moral judgment in frontotemporal dementia

Ezequiel Gleichgerrcht
Institute of Cognitive Neurology (INECO), Buenos Aires, Argentina

Teresa Torralva, María Roca, Mariángeles Pose, and Facundo Manes
Institute of Cognitive Neurology (INECO), and Favaloro University, Buenos Aires, Argentina

We showed that more advanced cognitive functions, such as moral cognition, is predicted by social cognition

It has been recently described as a multidimensional construct (Shamay-Tsoory 2009, 2010)

- A cognitive component: refers to the ability to process inferences about others' beliefs and intentions,

- An affective component: refers to the ability to process other peoples' emotions and feelings.

Differential Cognitive and Affective Theory of Mind abilities in Distinctive stages of behavioural variant Frontotemporal Dementia

[a]Institute of Cognitive Neurology (INECO), Buenos Aires Argentina

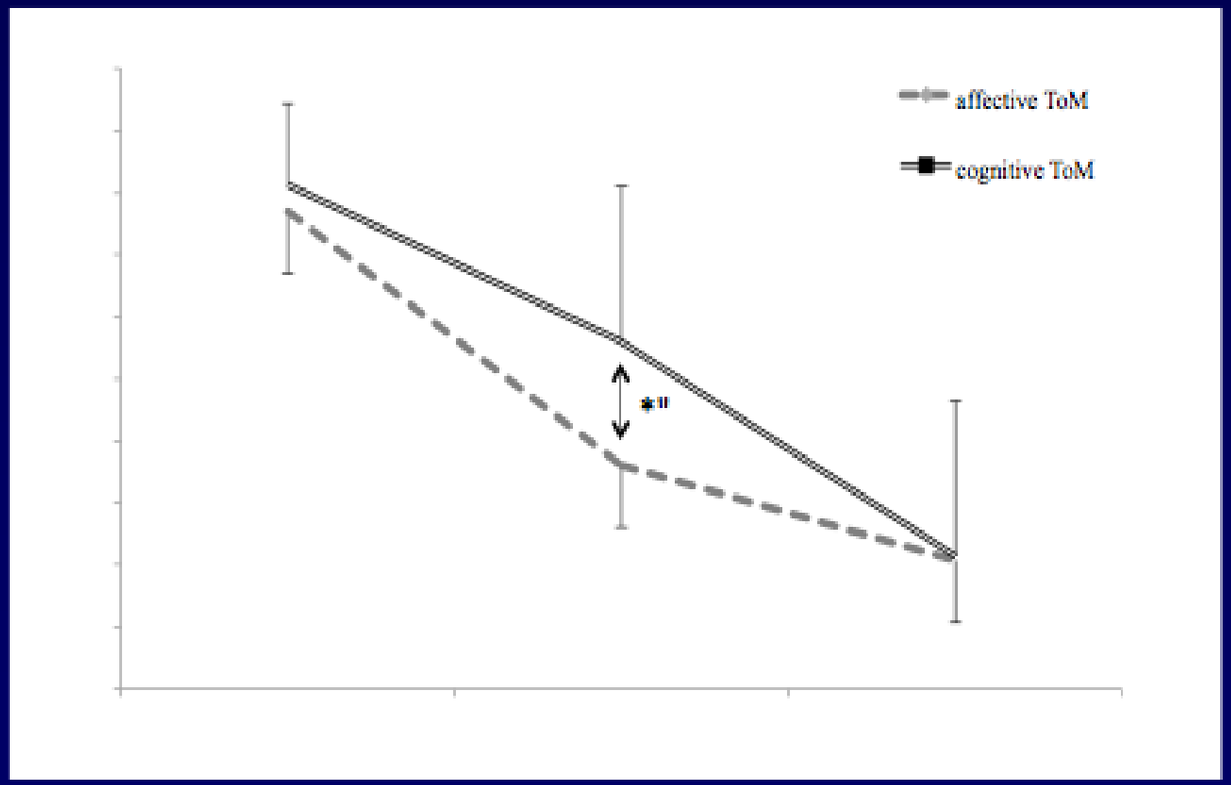
[b]UDP-INECO Foundation Core on Neuroscience (UIFCoN), Diego Portales University, Santiago, Chile.

[c]Institute of Neurosciences, Favaloro University, Buenos Aires, Argentina

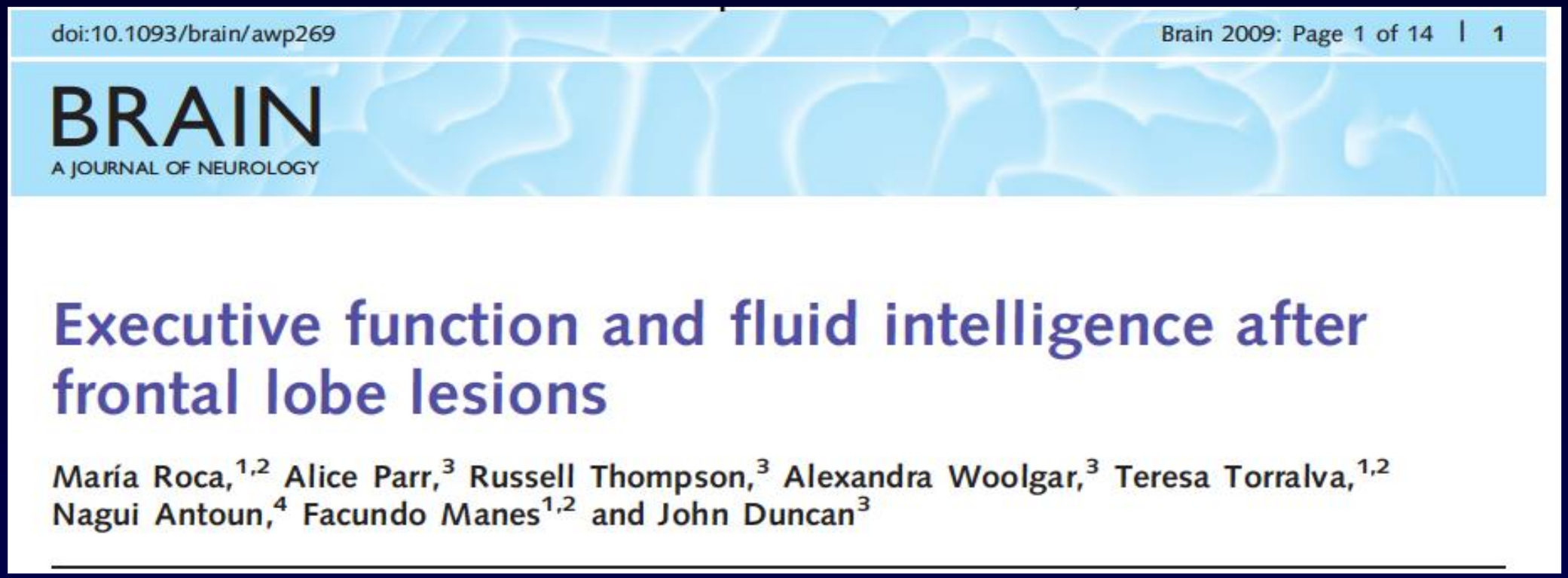
[d] Australian Research Council (ACR) Centre of Excellence in Cognition and its Disorders

Correspondence should be addressed to: Teresa Torralva (ttorralva@ineco.org.ar). Pacheco de Melo 1860, Buenos Aires, Argentina (1126). Phone/Fax: +54 (11) 4812-0010

Figure 1. Cognitive and Affective Theory of Mind values for controls and mild and moderate bvFTD groups.



- Findings from lesion studies have shown the key role of the prefrontal cortex in ToM abilities (Rowe et al., 2001, Stuss, Gallup & Alexander, 2001; Roca et al., 2011).


doi:10.1093/brain/awp269 Brain 2009: Page 1 of 14 | 1

BRAIN
A JOURNAL OF NEUROLOGY

Executive function and fluid intelligence after frontal lobe lesions

María Roca,[1,2] Alice Parr,[3] Russell Thompson,[3] Alexandra Woolgar,[3] Teresa Torralva,[1,2] Nagui Antoun,[4] Facundo Manes[1,2] and John Duncan[3]

- For a range of specific executive tests, we asked how far frontal deficits can be explained by a general fluid intelligence loss.

- For some widely used tests, e.g. Wisconsin Card Sorting, we found that fluid intelligence entirely explains frontal deficits.

- When patients and controls are matched on fluid intelligence, no further frontal deficit remains.

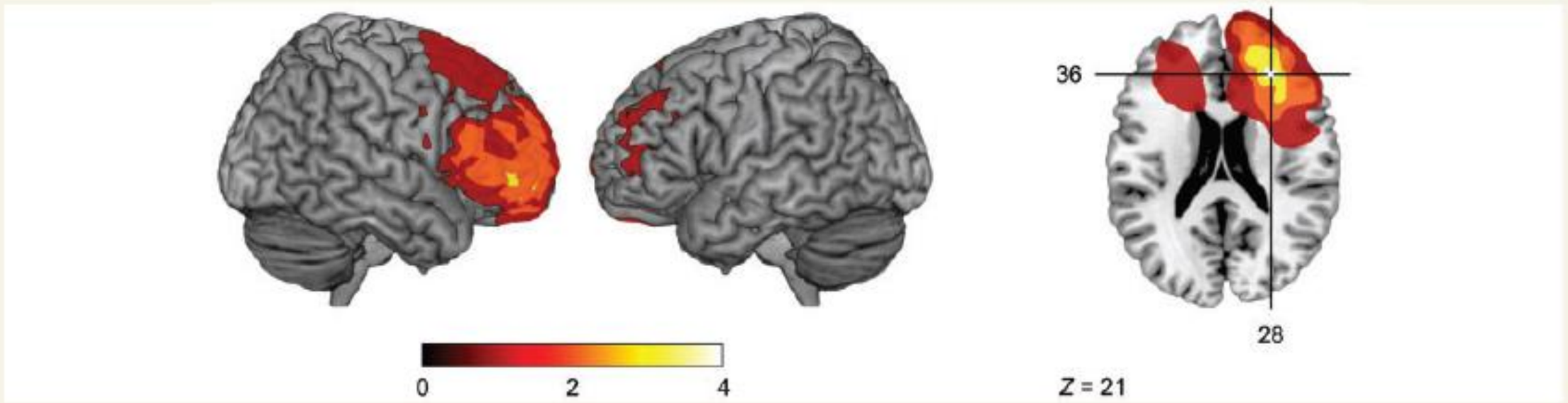


Figure 5 Experiment 2. Lesion overlap for 6 patients with worst average residual (performance adjusting for fluid intelligence) across Go–no go, Proverbs, Hayling, Hotel and *Faux Pas* tests. Left: overlap projected to brain surface; colour scale shows number of affected patients. Right: slice illustrating maximum overlap; coordinates in MNI space.

- For a second group of tasks deficits were not fully explained by fluid intelligence and the data suggest association with lesions in the right anterior frontal cortex.

- **While deficits in the classical executive tests are entirely explained by g, deficits in the social cognition, IGT and multitasking tests are not**

Neuropsychologia xxx (2011) xxx–xxx

Contents lists available at SciVerse ScienceDirect

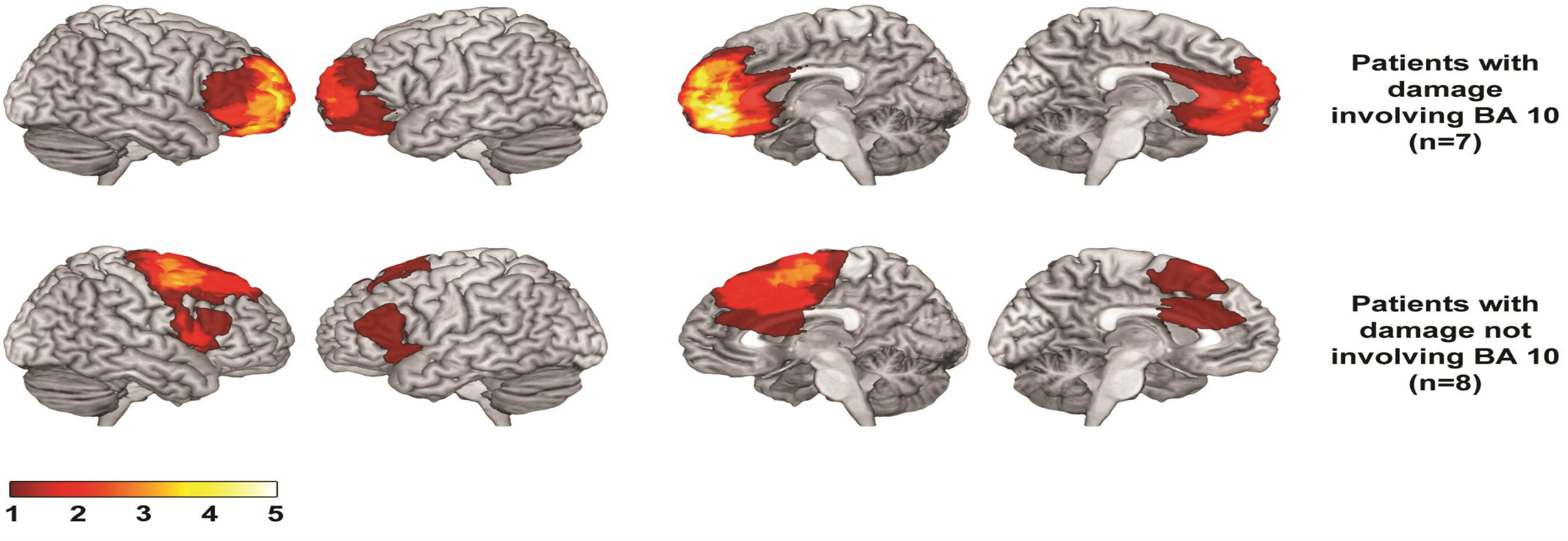
Neuropsychologia

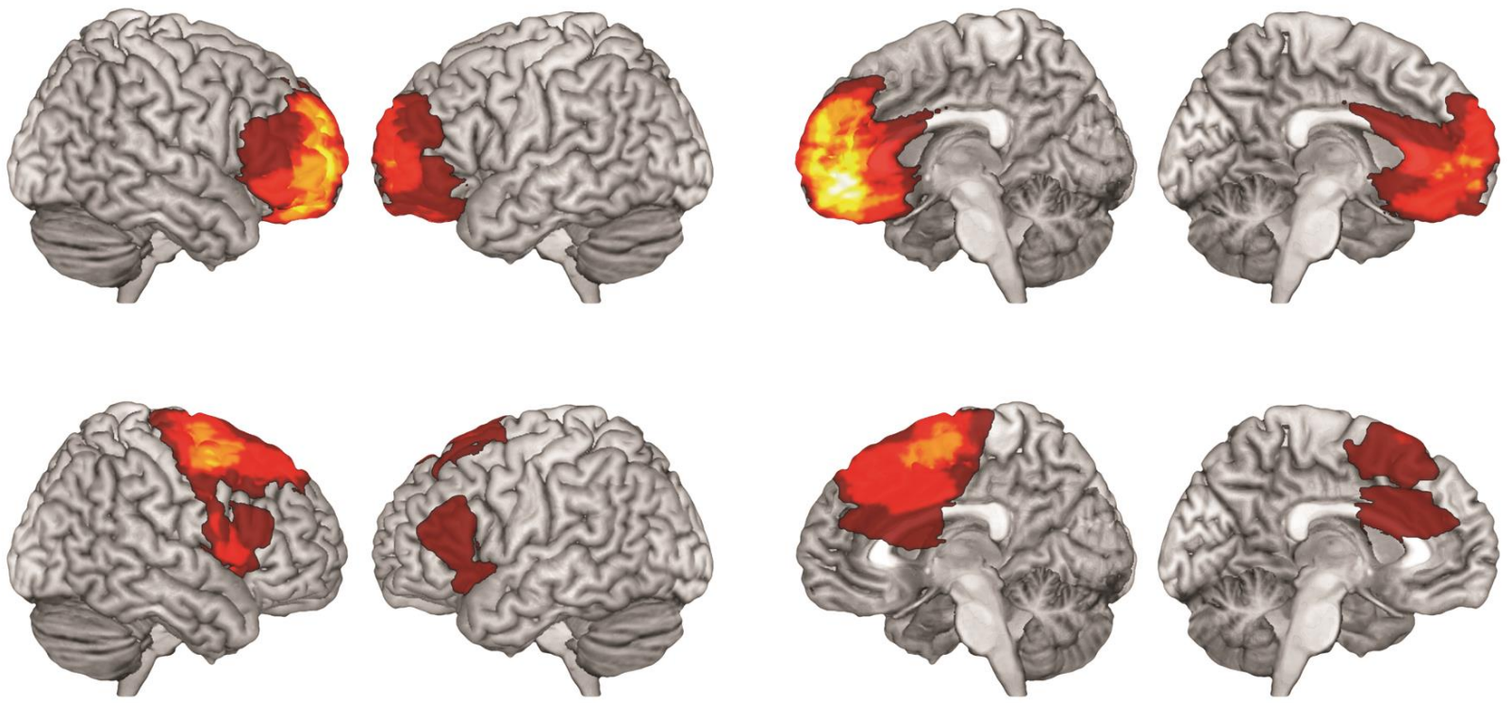
journal homepage: www.elsevier.com/locate/neuropsychologia

The role of Area 10 (BA10) in human multitasking and in social cognition: A lesion study

María Roca[a,b,c,*], Teresa Torralva[a,b], Ezequiel Gleichgerrcht[a,b], Alexandra Woolgar[d], Russell Thompson[d], John Duncan[d], Facundo Manes[a,b,*]

[a] Institute of Cognitive Neurology (INECO), Buenos Aires, Argentina
[b] Institute of Neurosciences, Favaloro University, Buenos Aires, Argentina
[c] Laboratory of Neuroscience, Universidad Diego Portales, Santiago, Chile
[d] MRC Cognition and Brain Sciences Unit, 15 Chaucer Road, Cambridge CB2 7EF, UK





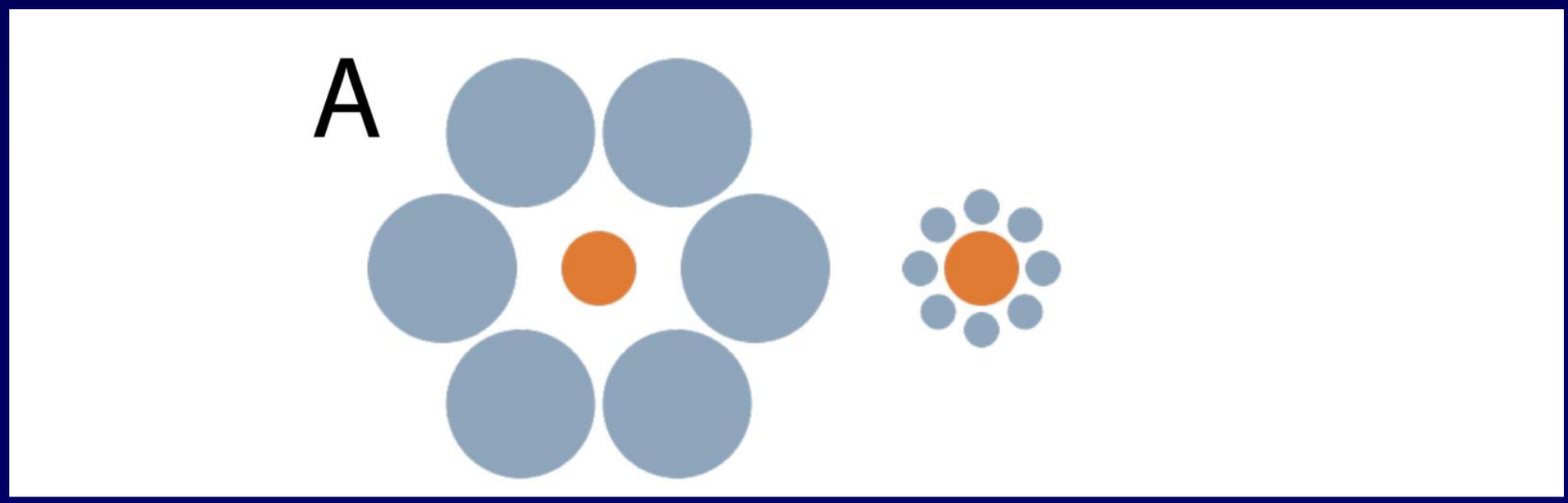
Non-BA10 patients performed more poorly than controls on classical executive functions tests.

Only the group with lesions involving BA10 showed deficits on multitasking and theory of mind tasks when compared with control subjects.

Contexto

- El contexto se define como el entorno que otorga significado y moldea una acción concreta.

- La integración de esta información en nuestra mente se lleva adelante como un proceso cerebral inconsciente y automático




(b)
WEBB
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Fire Fighters
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DEMOCRAT

Ibanez & Manes, Neurology, 2012, Bar et al, Nat Rev Neurosci, 2004

Neurology. April. 2012

Contextual social cognition and the behavioral variant of frontotemporal dementia

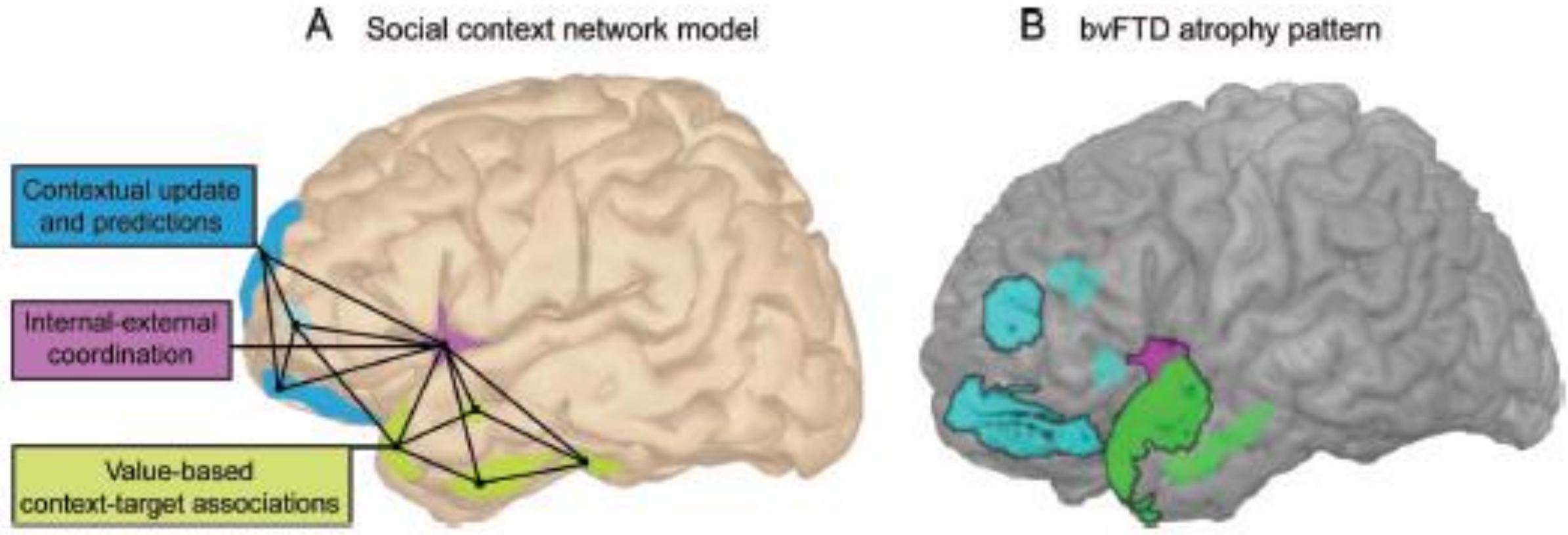
Agustin Ibañez, PhD
Facundo Manes, MS

ABSTRACT

The significance of social situations is commonly context-embedded. Although the role of context has been extensively studied in basic sensory processing or simple stimulus-response settings, its relevance for social cognition is unknown. We propose the social context network model (SCNM), a fronto-insular-temporal network responsible for processing social contextual effects. The SCNM may 1) update the context and use it to make predictions, 2) coordinate internal and external milieus, and 3) consolidate context-target associative learning. We suggest the behavioral variant of frontotemporal dementia (bvFTD) as a specific disorder in which the reported deficits in social cognition (e.g., facial recognition, empathy, decision-making, figurative language, theory of mind) can be described as context impairments due to deficits in the SCNM. Disruption of orbitofrontal-amygdala circuit, as well as the frontal, temporal, and insular atrophy in bvFTD, suggests a relationship between context-sensitive social cognition and SCNM. In considering context as an intrinsic part of social cognition, we highlight the need for a situated cognition approach in social cognition research as opposed to an abstract, universal, and decontextualized approach. The assessment of context-dependent social cognition paradigms, the SCNM, and their possible application to neuropsychiatric disorders may provide new insight into bvFTD and other related frontal disorders.

Neurology® 2012;78:1–1

Figure 2 The social context network model (SCNM) and behavioral variant of frontotemporal dementia (bvFTD)



OPEN ACCESS Freely available online

PLOS ONE

Contextual Social Cognition Impairments in Schizophrenia and Bipolar Disorder

Sandra Baez[1,2,4☯], Eduar Herrera[3☯], Lilian Villarin[6], Donna Theil[10], María Luz Gonzalez-Gadea[1,2], Pedro Gomez[8], Marcela Mosquera[9], David Huepe[5], Sergio Strejilevich[1], Nora Silvana Viglieca[2,11], Franziska Matthäus[6], Jean Decety[7], Facundo Manes[1], Agustín M. Ibañez[1,2,5*]

1 Institute of Cognitive Neurology (INECO) & Institute of Neuroscience, Favaloro University, Buenos Aires, Argentina, **2** National Scientific and Technical Research Council (CONICET), Buenos Aires, Argentina, **3** Universidad Autónoma del Caribe, Barranquilla, Colombia, **4** Pontifical Catholic University of Argentina, Buenos Aires, Argentina, **5** Laboratory of Cognitive and Social Neuroscience, Universidad Diego Portales, Santiago, Chile, **6** Interdisciplinary Center for Scientific Computing, University of Heidelberg, Heidelberg, Germany, **7** Departments of Psychology and Psychiatry, and Center for Cognitive and Social Neuroscience, University of Chicago, Chicago, Illinois, United States of America, **8** CARI University Hospital, Barranquilla, Colombia, **9** Resurgir Psychiatric Clinic, Barranquilla, Colombia, **10** University of Cologne, Cologne, Germany, **11** Instituto de Humanidades (IDH) de la Facultad de Filosofia y Humanidades, Universidad Nacional de Córdoba, Córdoba, Argentina

We reported that 15 patients with schizophrenia and 15 with bipolar disorder II showed poorer social cognition in tasks with greater context sensitivity and real-life involvement.

Deficits were more severe in schizophrenic than in bipolar patients.

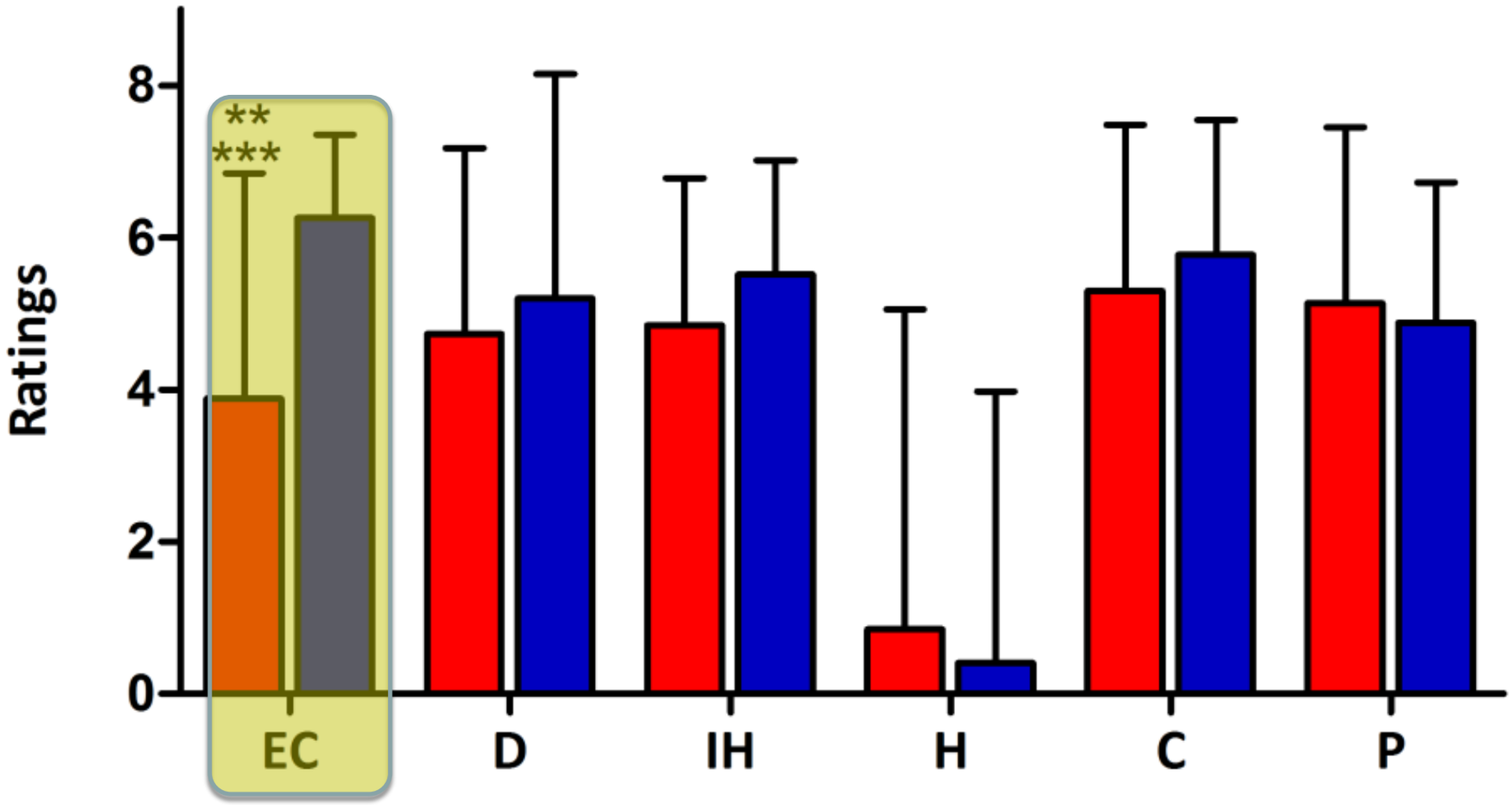
frontiers in
AGING NEUROSCIENCE

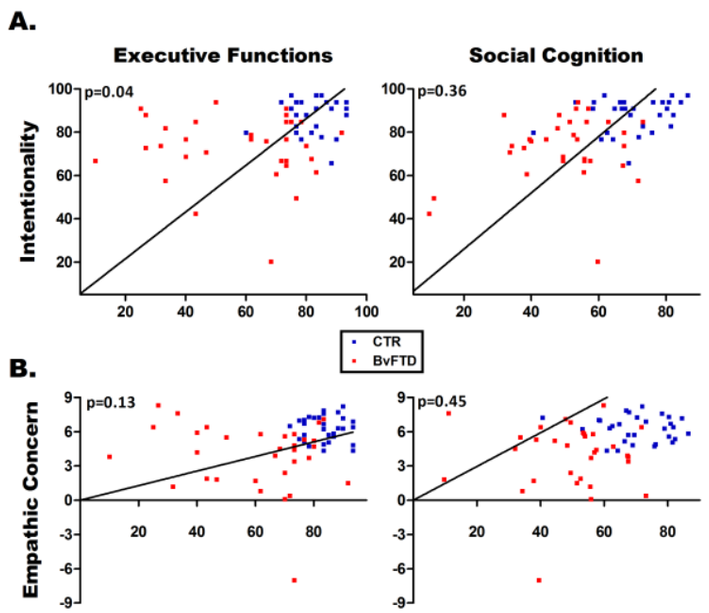
ORIGINAL RESEARCH ARTICLE
published: xx September 2014
doi: 10.3389/fnagi.2014.00262

Primary empathy deficits in frontotemporal dementia

*Sandra Baez[1,2,3,4†], Facundo Manes[1,2,3,5], David Huepe[2,6], Teresa Torralva[1,2], Natalia Fiorentino[1,2], Fabian Richter[7], Daniela Huepe[2,6], Jesica Ferrari[1], Patricia Montañes[8], Pablo Reyes[8], Diana Matallana[8], Nora S. Viglieca[3,9], Jean Decety[10] and Agustin Ibanez[1,2,3,5]**

C. Empathy Ratings- Intentional Pain





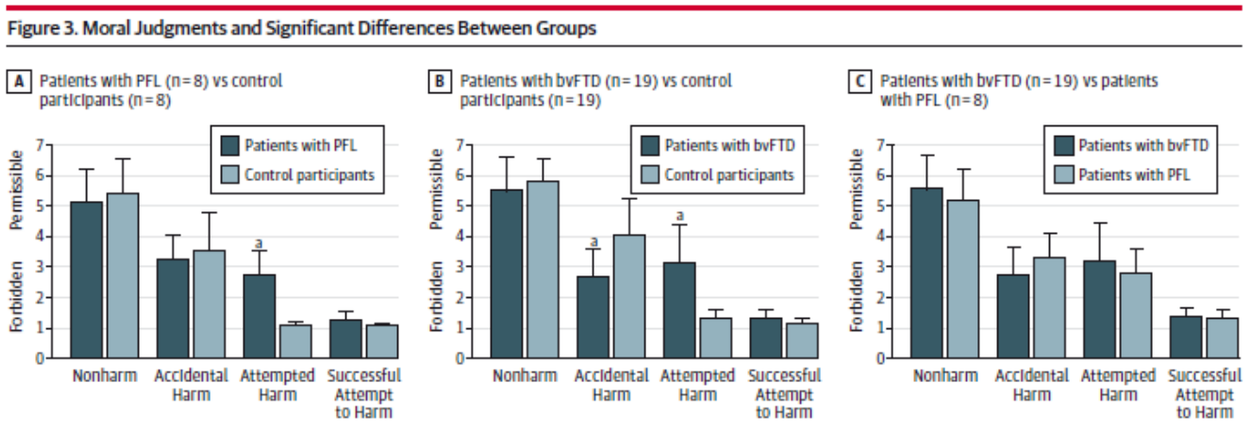
Case Report/Case Series

Comparing Moral Judgments of Patients With Frontotemporal Dementia and Frontal Stroke

Baez et al, 2014, JAMA Neurol

Sandra Baez, MS; Blas Couto, MD, PhD; Teresa Torralva, PsyD; Luciano A. Sposato, MD, MBA; David Huepe, PhD; Patricia Montañes, PhD; Pablo Reyes, MS; Diana Matallana, PhD; Nora S. Viglieca, PhD; Andrea Slachevsky, PhD; Facundo Manes, MD, MS; Agustin Ibanez, PhD

Figure 3. Moral Judgments and Significant Differences Between Groups



Patients with prefrontal lesions (PFL) and patients with the behavioral variant of frontotemporal dementia (bvFTD) judged attempted harm as significantly more permissible than the control participants. Patients with bvFTD judged accidental harm as less permissible than the control participants.

Figure 1. Lesions of Patients With Prefrontal Lesions

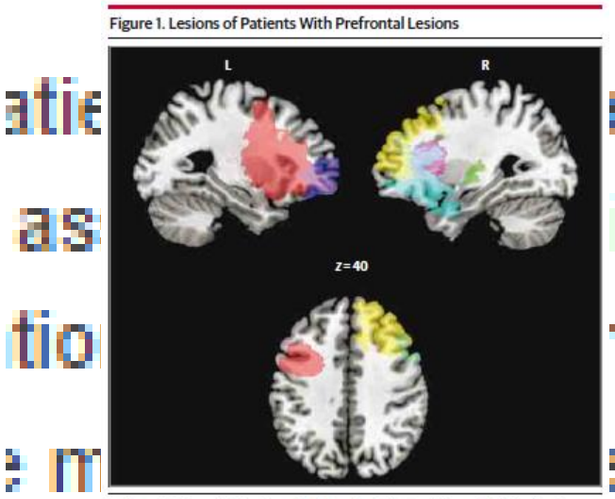
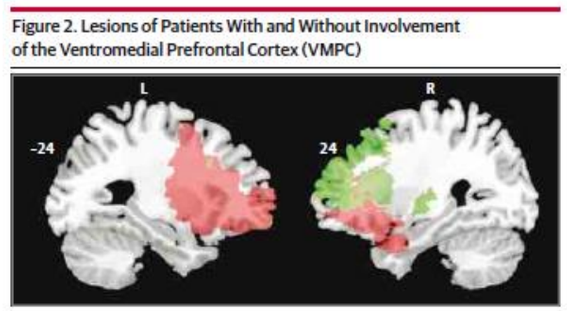
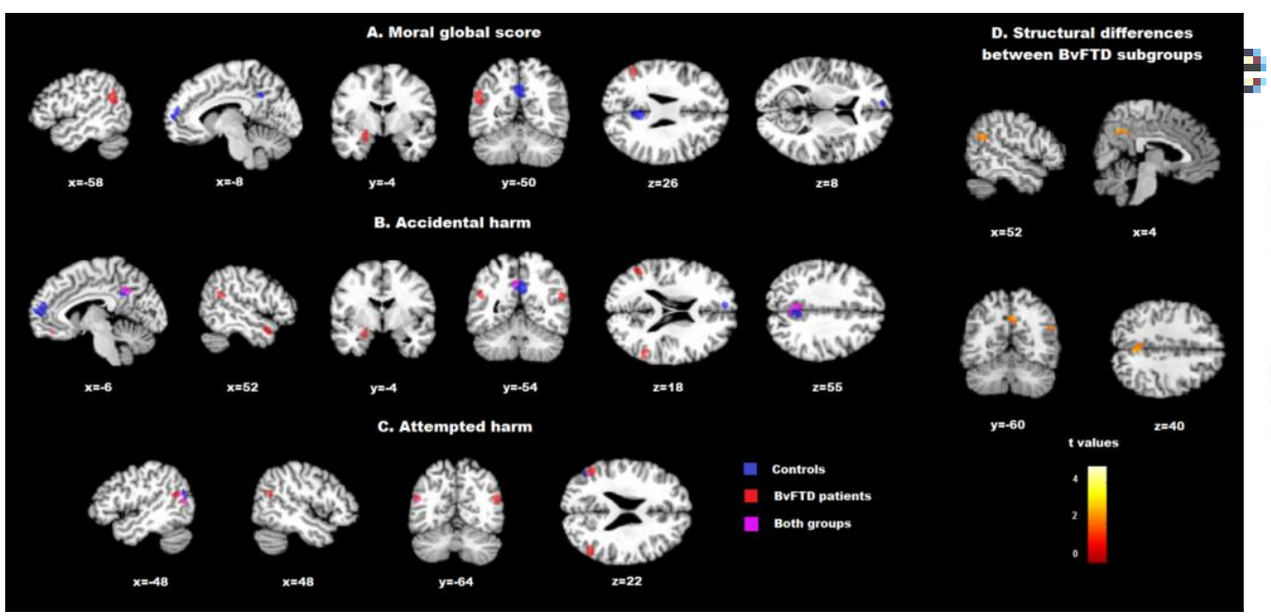
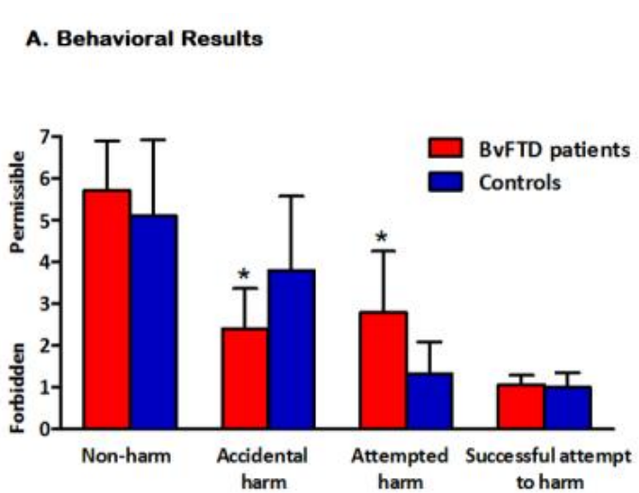


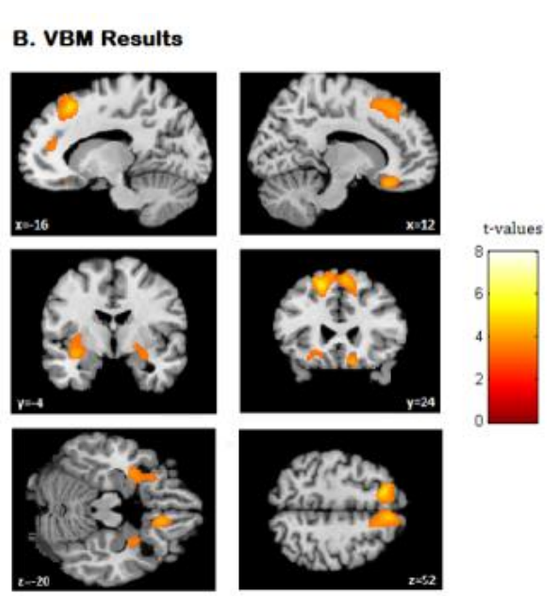
Figure 2. Lesions of Patients With and Without Involvement of the Ventromedial Prefrontal Cortex (VMPC)



Left and right brain medial views of patient lesions with (red) and without (green) VMPC damage. L indicates left and R, right.





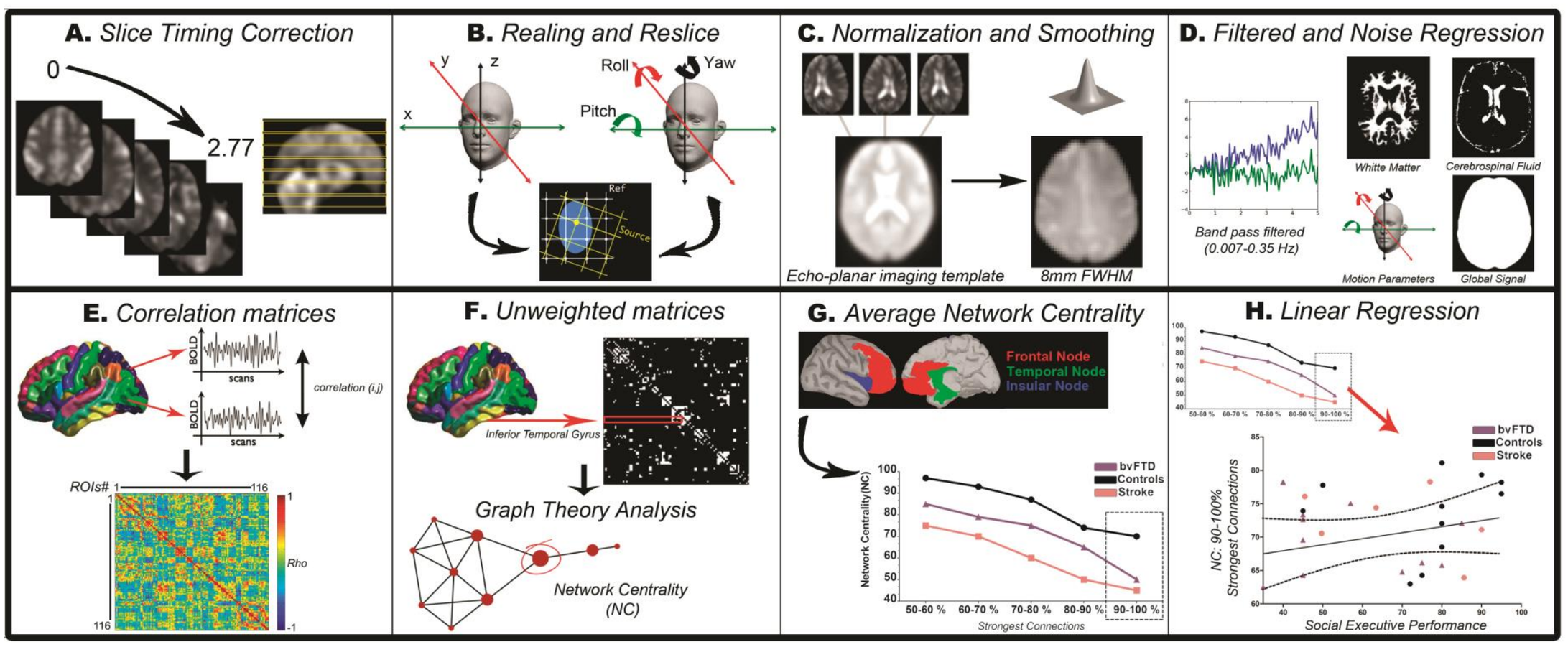


Journal of the International Neuropsychological Society (2015), **00**, 1–13.

doi:10.1017/S1355617715000703

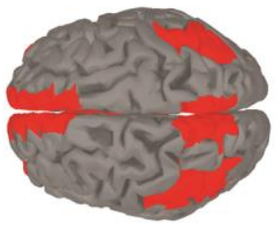
Brain Network Organization and Social Executive Performance in Frontotemporal Dementia

Lucas Sedeño,[1,2,3] Blas Couto,[1,2,3] Indira García Cordero,[1] Margherita Melloni,[1,2,3] Sandra Baez,[1,2,3] Juan Pablo Morales Sepúlveda,[2] Daniel Fraiman,[3,4] David Huepe,[2] Esteban Hurtado,[2,5] Diana Matallana,[6] Rodrigo Kuljis,[7] Teresa Torralva,[1,2] Dante Chialvo,[3,8] Mariano Sigman,[9] Olivier Piguet,[10,11] Facundo Manes,[1,2,3,11] AND Agustin Ibanez[1,2,3,11,12]

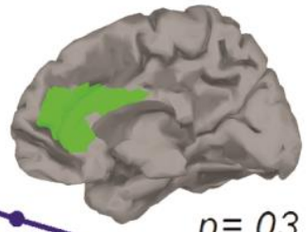


bvFTD Controls Stroke

Default Mode network (DMN)

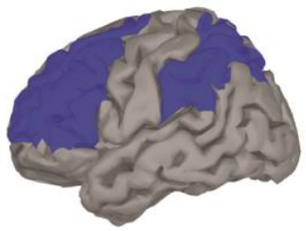


Salience network (SN)

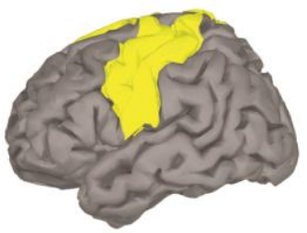


p=.03

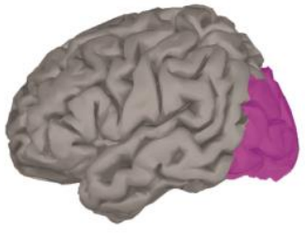
Fronto-parietal network (FPN)



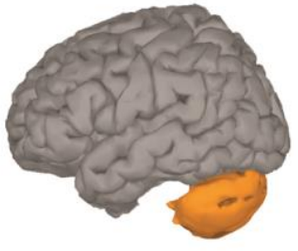
Sensorimotor network (SMN)



Visual network (VN)



Cerebellar network (CBR)



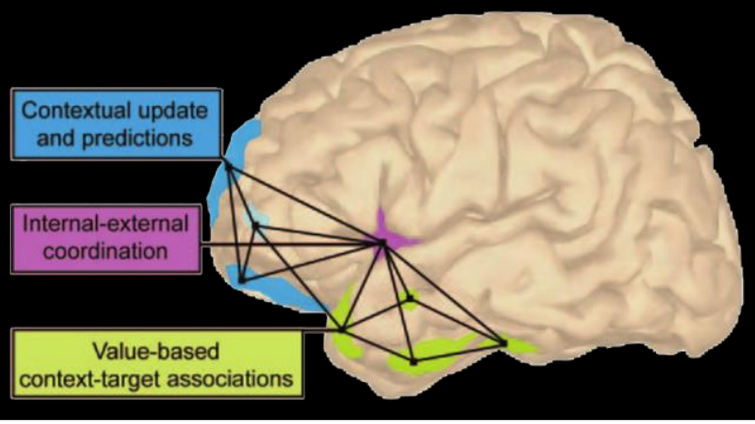
Network Centrality(NC)

90
80
70
60
50

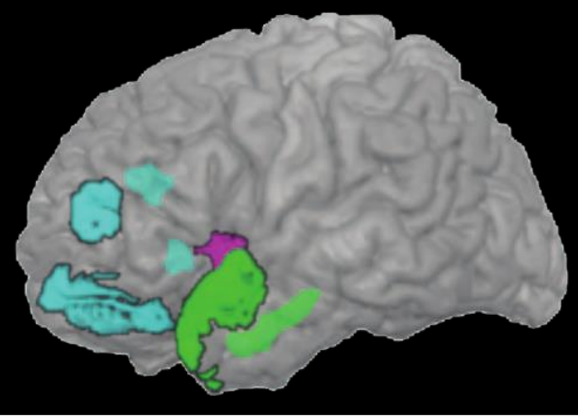
70-80% 80-90% 90-100%

Strongest Connections

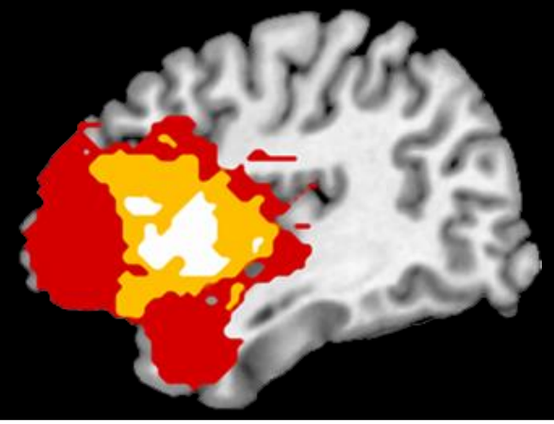
Social context network model



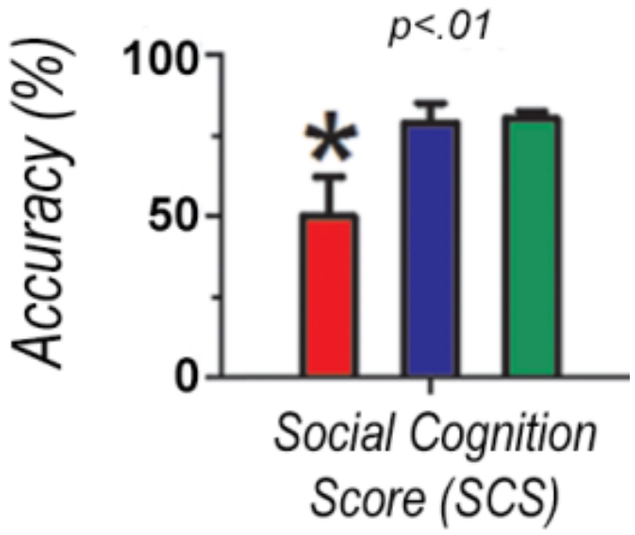
bvFTD atrophy pattern



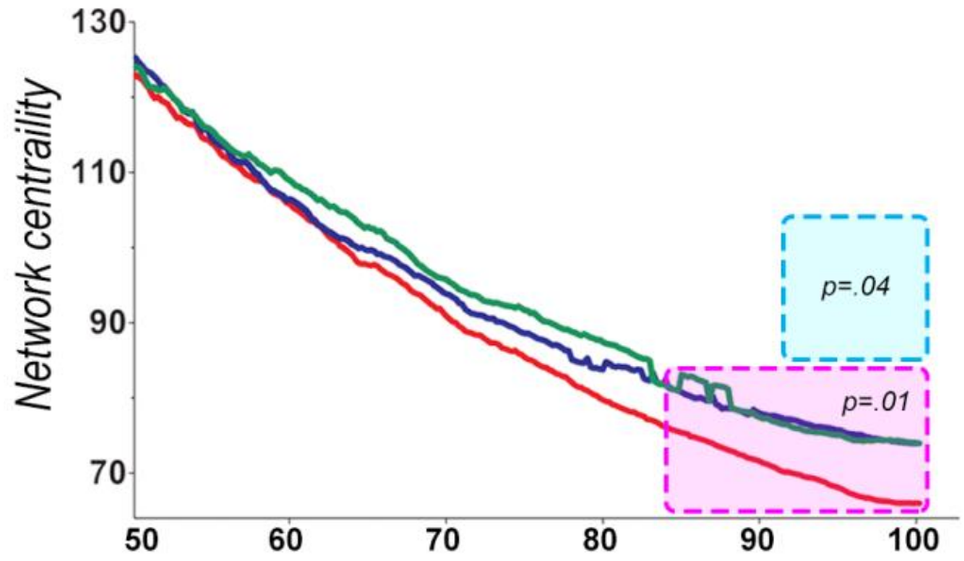
Fronto-insular strokes



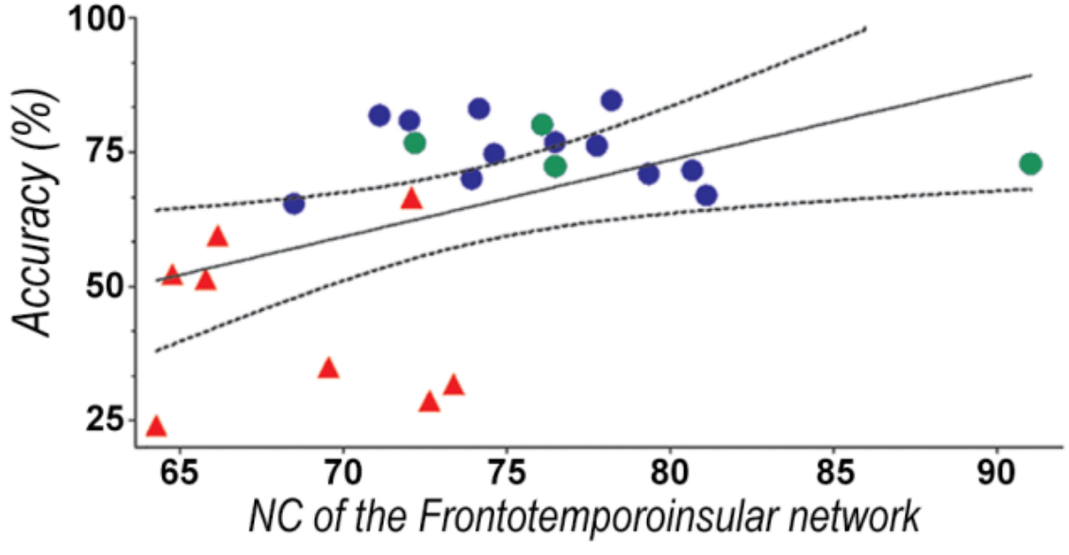
1- Behavioral Results



2- Connectivity deficits in bvFTD



3- Connectivity associated with Social Cognition Score (SCS)



International brain network:

A multicenter analysis of brain dynamics in bvFTD

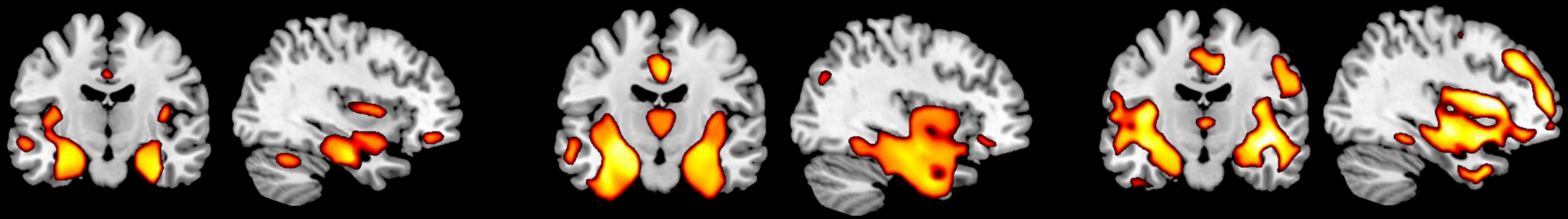
On going project

Argentina

Colombia

Australia

Patrón de atrofia en bvFTD

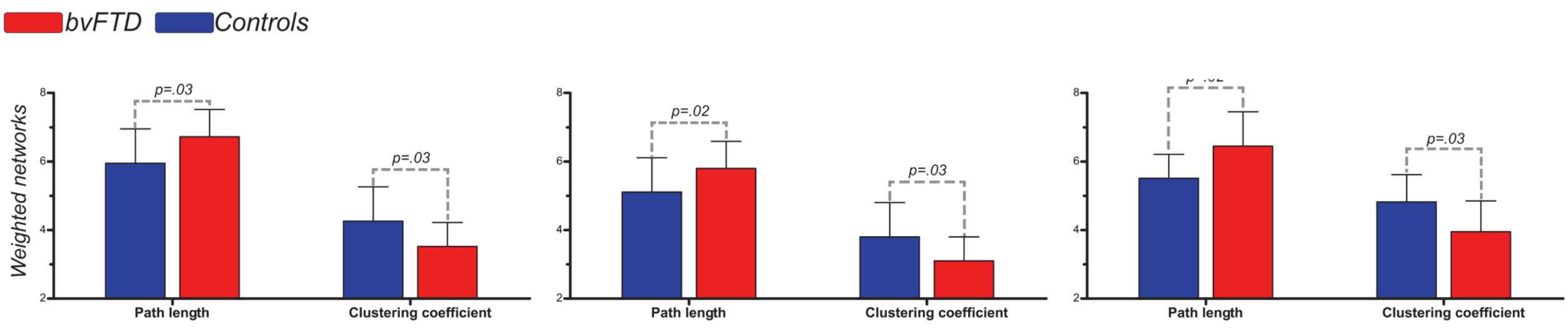


1- Alteraciones en la integridad de la dinámica cerebral en pacientes con bvFTD

Argentina

Colombia

Australia



Brain Advance Access published March 31, 2009

doi:10.1093/brain/awp041

BRAIN
A JOURNAL OF NEUROLOGY

A neuropsychological battery to detect specific executive and social cognitive impairments in early frontotemporal dementia

Teresa Torralva,[1,2] María Roca,[1,2] Ezequiel Gleichgerrcht,[1] Tristán Bekinschtein[1,*] and Facundo Manes[1,2]

Contents lists available at ScienceDirect

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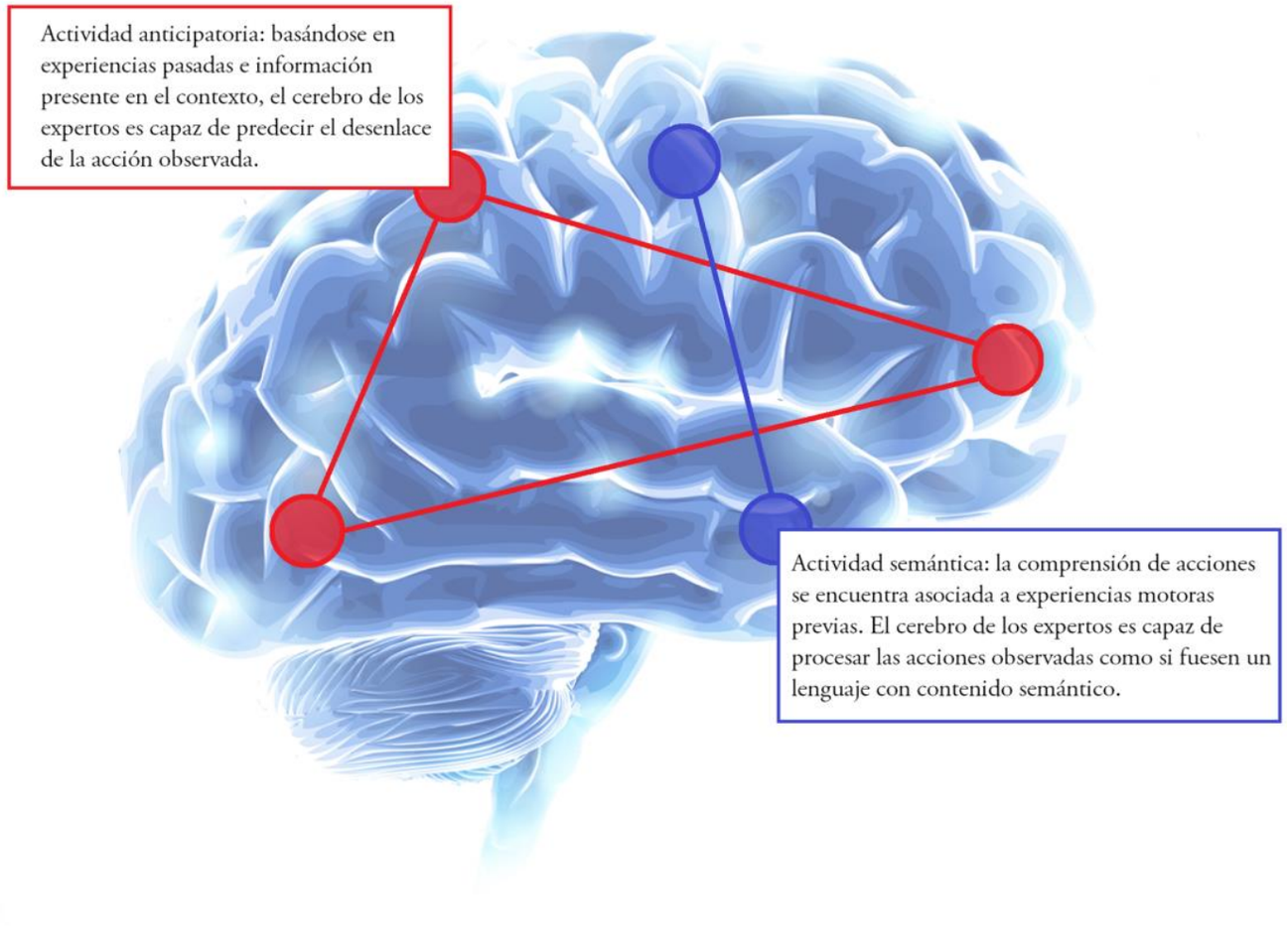
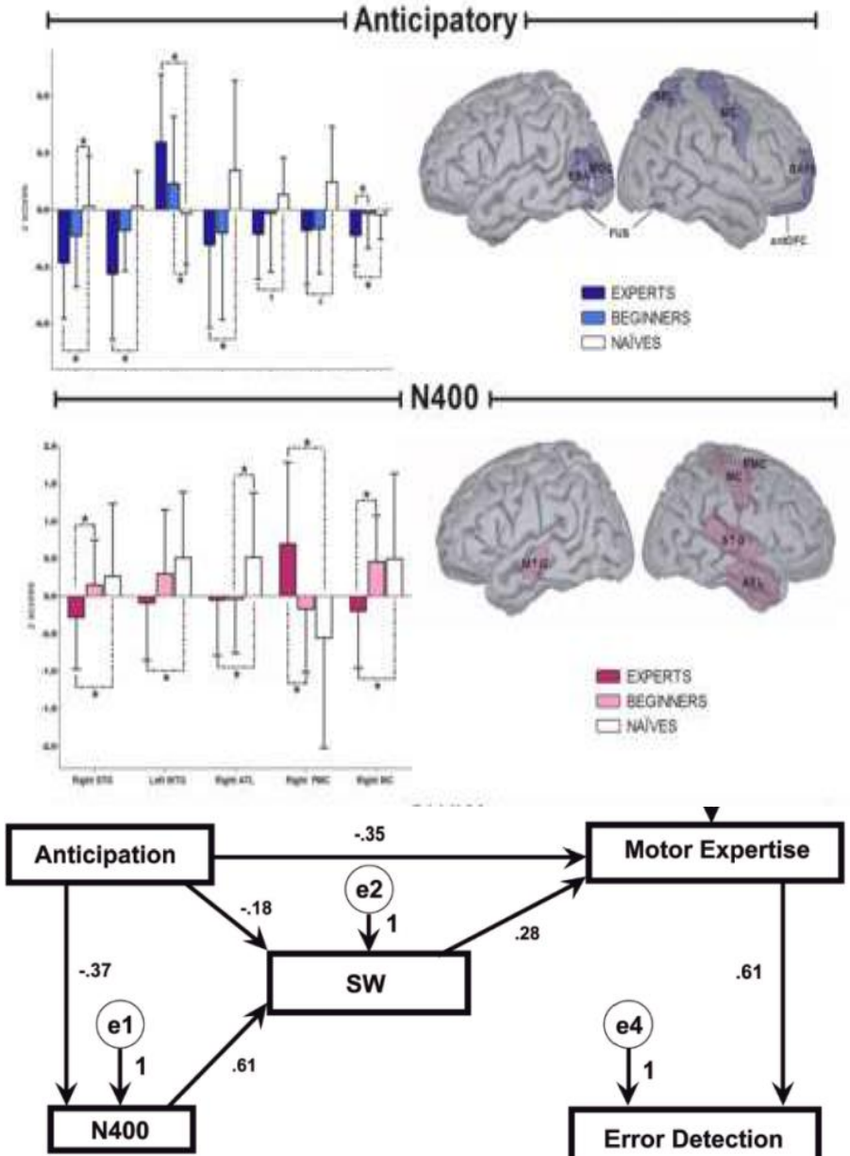
journal homepage: www.elsevier.com/locate/ynimg

Time to Tango: Expertise and contextual anticipation during action observation

Lucía Amoruso [a,b,c,h], Lucas Sedeño [a,b,c,h], David Huepe [h], Ailin Tomio [a], Juan Kamienkowski [c,d], Esteban Hurtado [f], Juan Felipe Cardona [a,b,c], Miguel Ángel Álvarez González [e], Andrés Rieznik [c,d], Mariano Sigman [c,d], Facundo Manes [a,b,c,h,i], Agustín Ibáñez [a,b,c,g,h,i,*]





Conclusions

- **Context matters in neurodegeneration**
  - SCNM and bvFTD
- **Frontotemporal networks for contextual predictions**
  - Different involvement in social cognition
- **The BIG challenge 1: Towards ecological and everyday cognition measurements AND its neural signatures**
- **The BIG challenge 2: Translational Neuroscience applications**

World Psychiatry 13:2 - June 2014

Bridging psychiatry and neurology through social neuroscience

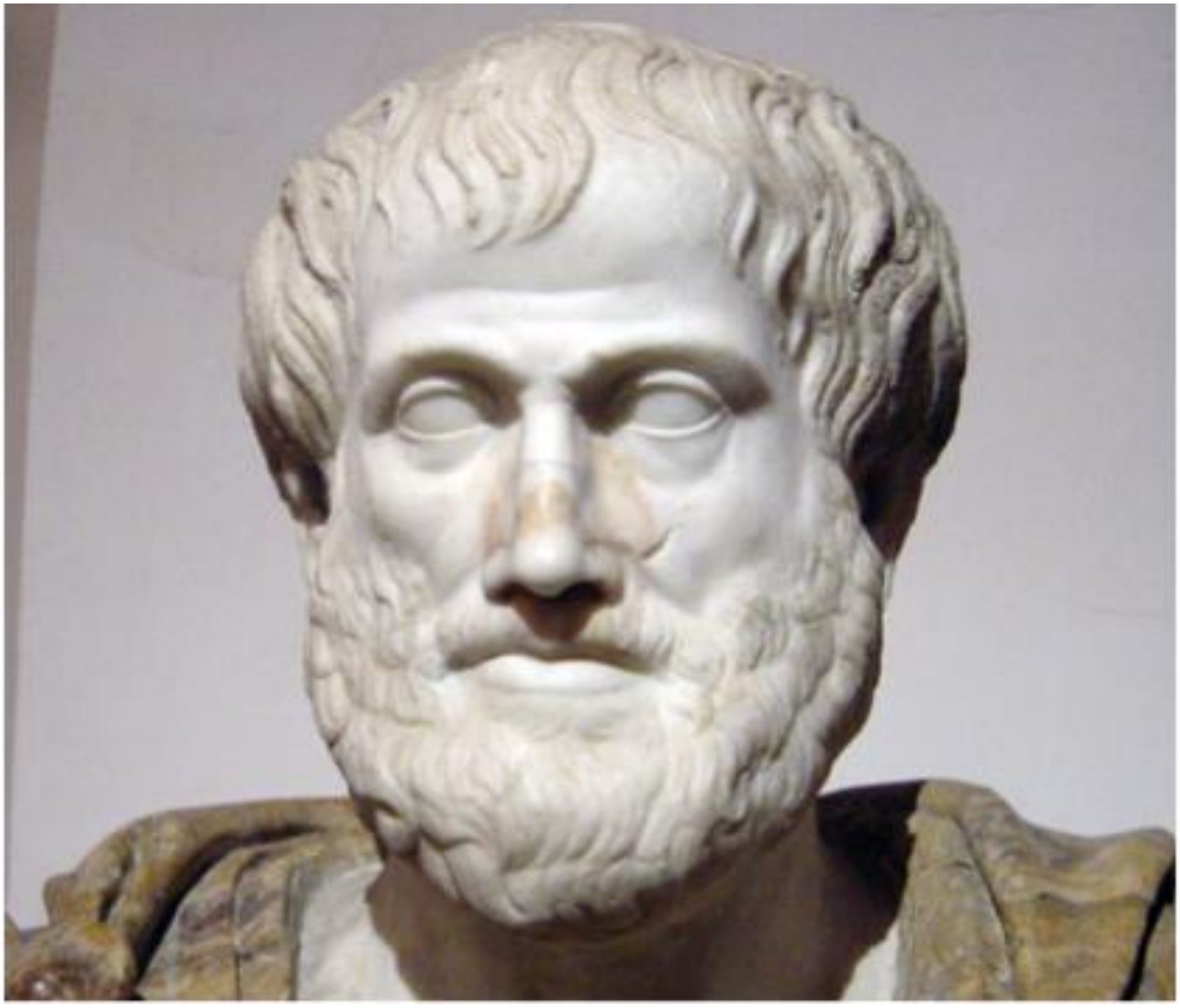
Agustin Ibáñez[1-3], Rodrigo O. Kuljiš[2,4], Diana Matallana[5], Facundo Manes[1-3,6]

[1]Laboratory of Experimental Psychology and Neuroscience, Institute of Cognitive Neurology, Favaloro University, Buenos Aires, Argentina; [2]UDP-INECO Foundation Core on Neuroscience, Diego Portales University, Santiago, Chile; [3]National Scientific and Technical Research Council, Buenos Aires, Argentina; [4]Neurology Unit, El Carmen Hospital, Maipú, Chile; [5]Intellectus Memory and Cognition Center, Pontificia Universidad Javeriana, Bogotá, Colombia; [6]Australian Research Council Centre of Excellence in Cognition and its Disorders, Macquarie University, Sidney, NSW, Australia

Social neuroscience launched a novel the use of different levels of scientific inquiry assessing a) behavioral social cognition sensitivity to psychiatric impairment, b) neural networks engaged in social behaviors, c) the genetic underpinning of social phenomena, and d) the influence of the social environment on biological processes, have been outstandingly addressed by Cacioppo et al's paper (1).

Neuroscientific progress suggests that the separation between psychiatry and neurology is counterproductive. Classical neurological conditions present a range of social cognition impairments that are often underrecognized and frequently undertreated. Social neuroscience has made important progress in elucidating the neurobiology of the neuroscience research for a specific neuropsychiatric condition, the behavioral variant of frontotemporal dementia (bvFTD). Moreover, we highlight the importance of social neuroscience for the cross-talk among psychiatry and neurology.

BvFTD is a neurodegenerative disease whose initial symptoms are often confused with several psychiatric conditions. It is characterized by early decline in social interpersonal behavior, personality changes, and progressive deterioration in social functioning (2). Conventional neuropsychological assessment as well as clinical routine neuroimaging have been not been very useful for early diagnosis (2). The social neurosci-



Collaborators

We ain’t perfect, but we’re tryin’ our best……

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Pablo Lopez
Joaquin Barruta
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Natalia Sierra
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