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NPS dell'Autismo

Lezione n 22 del 22 Dicembre 2020

-A TUTTO AUTISMO

CellPress Trends in Cognitive Sciences

Opinion

A Sensorimotor Numerosity System

Giovanni Anobile,[1] Roberto Arrighi,[1] Elisa Castaldi,[1,2] and David C. Burr[1,3,*]

Incoming sensory input provides information for the planning and execution of actions, which yield motor outcomes that are themselves sensory inputs. One dimension where action and perception strongly interact is numerosity perception. Many non-human animals can estimate approximately the number of external elements as well as their own actions, and neurons have been identified that respond to both. Recent psychophysical adaptation studies on humans also provide evidence for neural mechanisms responding to both the number of externally generated events and self-produced actions. Here we advance the idea that these strong connections may arise from dedicated sensorimotor mechanisms in the brain, part of a more generalized system interfacing action with the processing of other quantitative magnitudes such as space and time.

A Sensorimotor Numerosity System

Highlights

Behavioral studies show that humans and other animals can estimate the numerosity of both external stimuli and self-produced actions.

Recent psychophysical studies using motor-adaptation techniques have characterized the link between action and magnitude perception, advancing the concept of a sensorimotor system encoding both external stimuli and internally generated actions.

The sensorimotor numerosity system might reside in the parietal cortex.

Trends in Cognitive Sciences

CellPress

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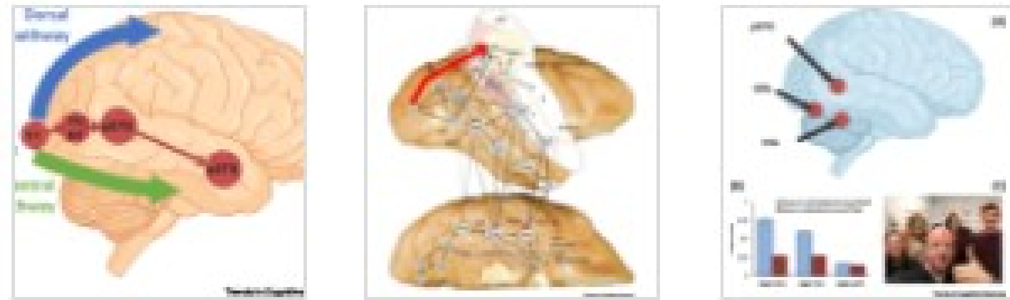
In Press, Corrected Proof



Opinion

Evidence for a Third Visual Pathway Specialized for Social Perception

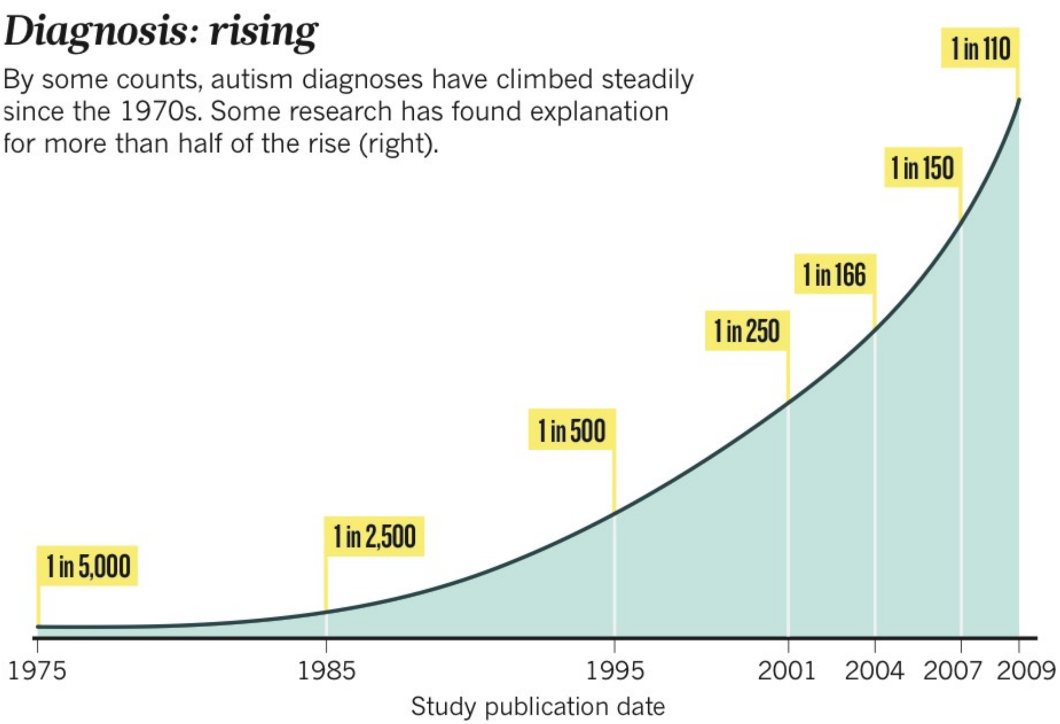
David Pitcher[1], Leslie G. Ungerleider[2]

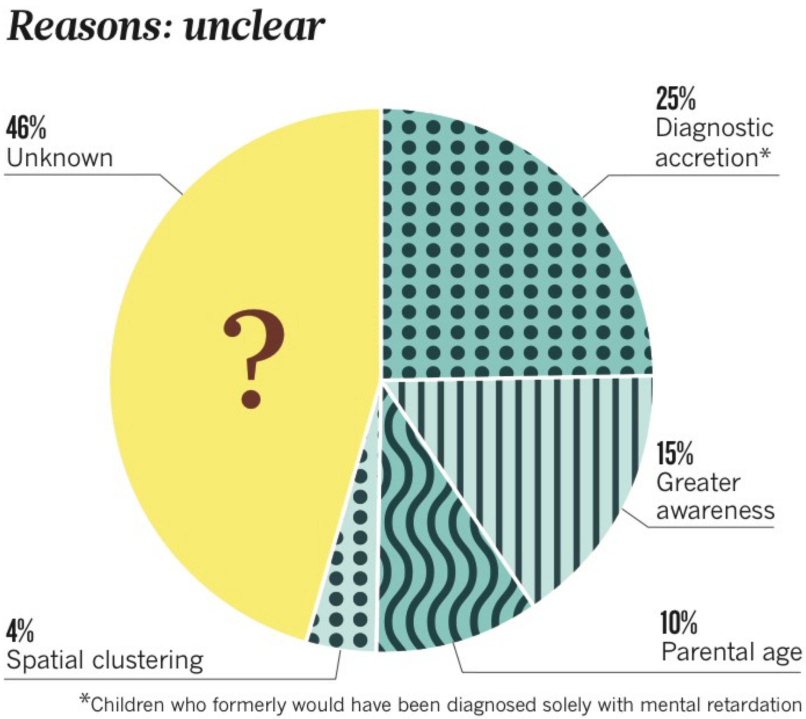
Existing models propose that primate visual cortex is divided into two functionally distinct pathways. The ventral pathway computes the identity of an object; the dorsal pathway computes the location of an object, and the actions related to that object. Despite remaining influential, the two visual pathways model requires revision. Both human and non-human primate studies reveal the existence of a third visual pathway on the lateral brain surface. This third pathway projects from early visual cortex, via motion-selective areas, into the superior temporal sulcus (STS). Studies demonstrating that the STS computes the actions of moving faces and bodies (e.g., expressions, eye-gaze, audio-visual integration, intention, and mood) show that the third visual pathway is specialized for the dynamic aspects of social perception.

Keywords

superior temporal sulcus (STS); V5/MT; neuroanatomy; face perception; body perception; social perception

Prevalenza in crescita…quali sono le ragioni?





Weintraub K., (2011) Autism Count. *Nature*

SCIENTIFIC REPORTS

OPEN

Overstimulation of newborn mice leads to behavioral differences and deficits in cognitive performance

SUBJECT AREAS:
DEVELOPMENT
ANIMAL BEHAVIOUR
PHENOMENA AND PROCESSES
DEVELOPMENTAL BIOLOGY

D. A. Christakis[1,2]*, J. S. B. Ramirez[1]* & J. M. Ramirez[1,2]

[1]Seattle Children's Research Institute PO Box 5371, Seattle WA 98121, [2]University of Washington.

Standard Housing → Overstimulation → Standard Housing → Behavioral Testing

10 Days | 42 Days | 10 Days | 10 Days

Figure 1 | Mouse overstimulation chamber, and experimental procedure.

Le conoscenze in merito all’ASD si sono modificate in modo drammatico nelle ultime due decadi ☺

Tuttavia, a più di 70 anni dalla sua individuazione da parte di Leo Kanner (1943), ***persistono ancora notevoli incertezze*** in termini di eziologia, elementi caratterizzanti il quadro clinico, confini nosografici con sindromi simili, diagnosi, presa in carico ed evoluzione a lungo termine. (mostra «who’s afrait…»)

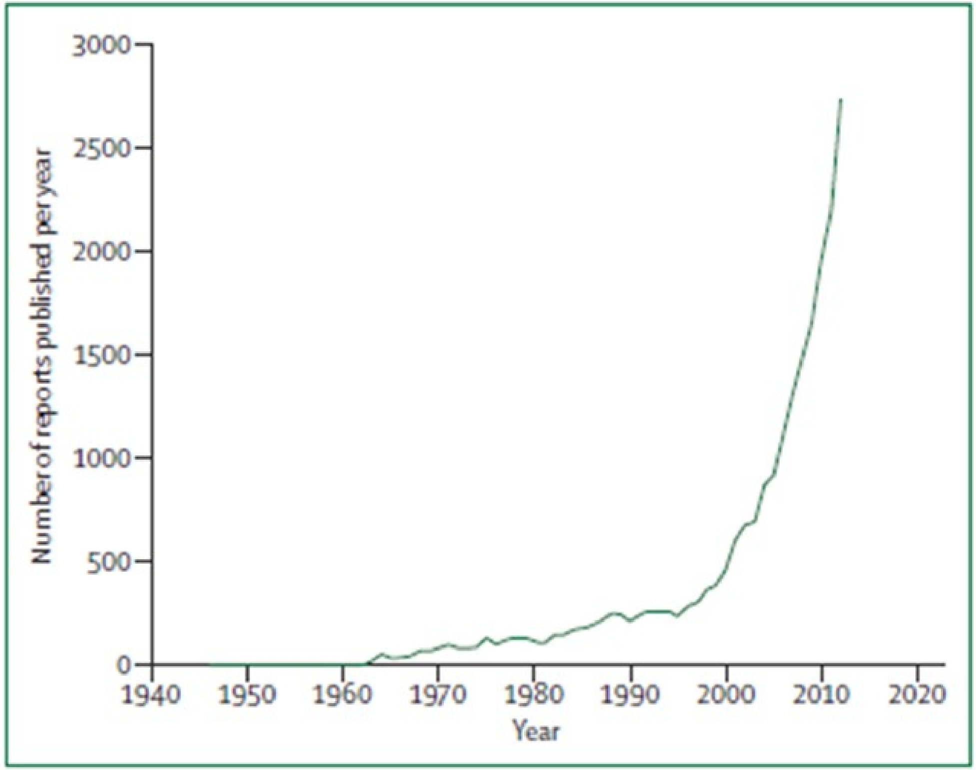


Figure: **The growth of autism research**
Almost three times as many reports about autism were published between 2000 and 2012 (n=16741), as between 1940 and 1999 (n=6054). These calculations are based on a keyword search of PubMed with the term "'autism' OR 'autism spectrum disorder' OR 'pervasive developmental disorder' OR 'Asperger syndrome'".

Tra le poche certezze in ambito *ASD* c'è che ***si ottiene una prognosi migliore se la presa in carico è precoce (24 mesi).*** ☺

Stime ottenute tramite le linee guida SINPIA (Società Italiana di Neuropsichiatria Infantile e Adolescenza) mostrano infatti:

- Miglior sviluppo di intelligenza sociale
- Migliori performance di comunicazione e linguaggio
- Migliori risultati di QI e comportamenti funzionali
- Minor numero e gravità di sintomi specifici

Età media di diagnosi in Italia 3-5 anni ☹

- *Fombonne, E. (2003)*
- Volkmar, F. R., Lord, C., Bailey, A., Schultz, R. T., & Klin, A. (2004)

Stime attuali…

Prognosi:

•Un’altissima percentuale **(dal 60% al 90%)** di bambini ASD divengono **adulti non autosufficienti**, e continuano ad aver bisogno di cure per tutta la vita.

•Un numero molto minore di soggetti ASD **(15-20%)** è **in grado di vivere e lavorare** all’interno della comunità, con vari gradi di indipendenza

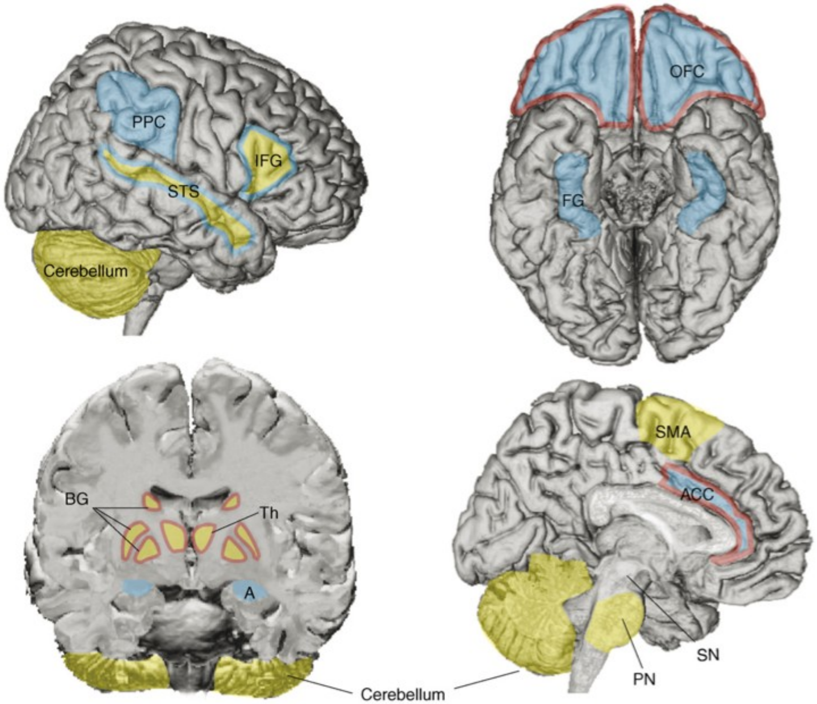
- *Fombonne E (2003);*
- *Volkmar et al., (2004)*

Ipotesi NeuroPatologiche nel ASD

Autismo: Ipotesi Neuropatologiche (1)

Amaral, Schumann & Wu Nordhal (2008) – Neuroanatomy of Autism *(Trends in Neurosci)*

DOVE ci si aspetta di trovare la neuropatologia dell'ASD?

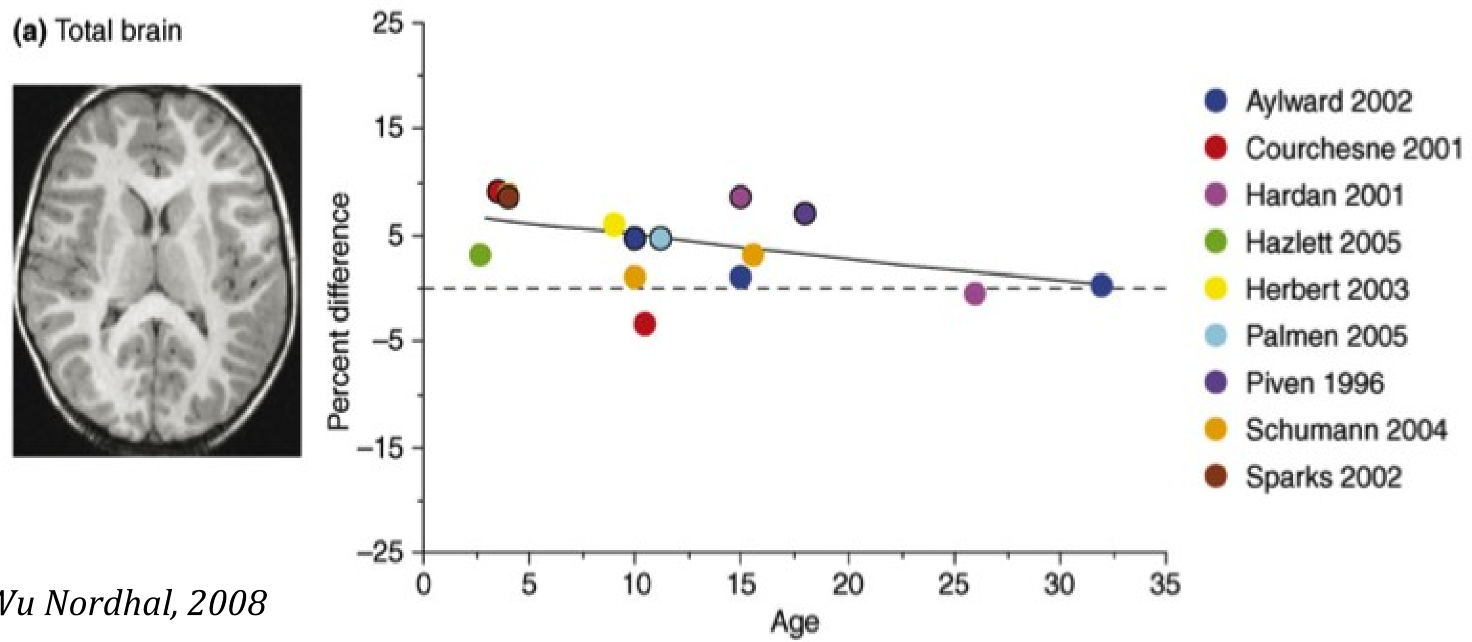


Social impairment	Communication deficits	Repetitive behaviors
OFC – Orbitofrontal cortex ACC – Anterior cingulate cortex FG – Fusiform gyrus STS – Superior temporal sulcus A – Amygdala mirror neuron regions IFG – Inferior frontal gyrus PPC – Posterior parietal cortex	IFG- Inferior frontal gyrus (Broca's area) STS – Superior temporal sulcus SMA – Supplementary motor area BG – Basal ganglia SN – Substantia nigra Th – Thalamus PN – Pontine nuclei cerebellum	OFC – Orbitofrontal cortex ACC – Anterior cingulate cortex BG – Basal ganglia Th – Thalamus

Autismo: Ipotesi Neuropatologiche (2)

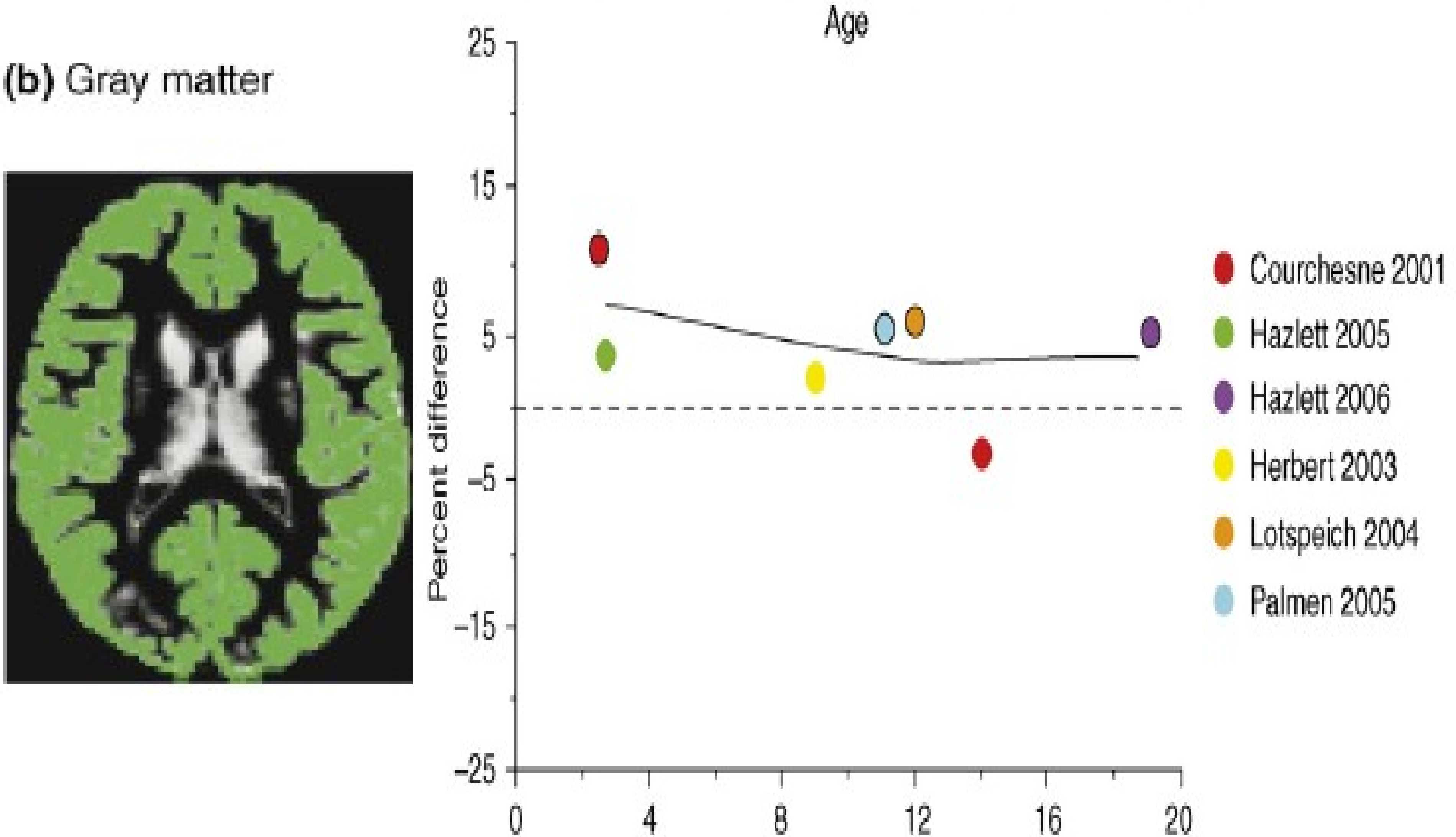
- Una delle teorie prevalenti sulla neuropatologia del ASD prevede che il cervello sia sottoposto ad un periodo di **anormale crescita neurale durante i primi mesi di vita**.

- Coinvolge prevalentemente la materia bianca cerebrale (?)

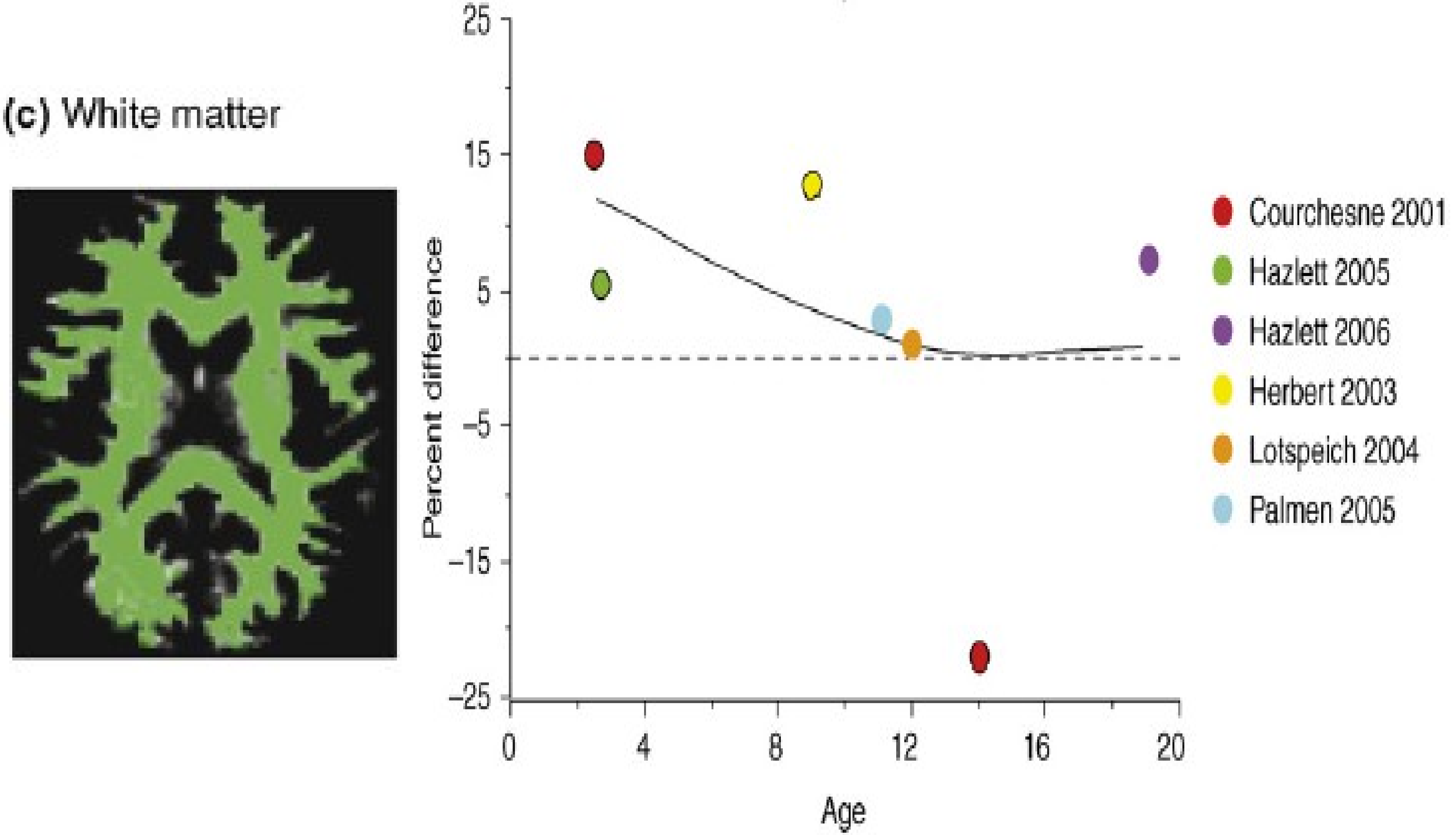


Amaral, Schumann & Wu Nordhal, 2008

(b) Gray matter



(c) White matter



Autismo: Ipotesi Neuropatologiche (3)

- Anche se studi post-mortem e MRI hanno evidenziato la patologia di **lobi frontali**, **amigdala** e **cervelletto**...
- ...non vi sono ad oggi chiare e consistenti evidenze che chiariscano la neuropatologia dell'autismo.

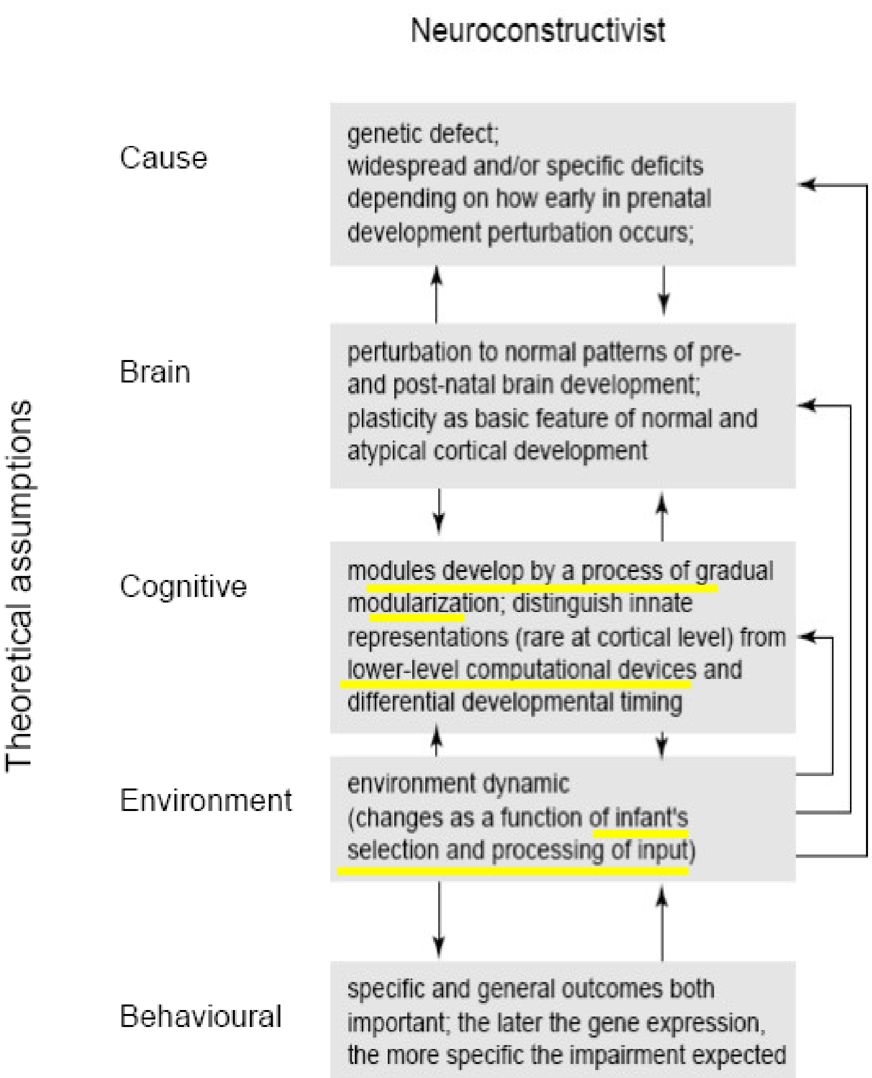
?

E' LARGAMENTE IMPROBABILE RISCONTRARE UNA NEUROPATOLOGIA COMUNE A TUTTI GLI INDIVIDUI.

LE DIFFERENZE CEREBRALI RISPETTO AD UNO SVILUPPO TIPICO SONO IL RISULTATO FINALE DI UN PROCESSO DI SVILUPPO PATOLOGICO CHE INIZIA FIN DALLE PRIMISSIME FASI DELLO SVILUPPO.

Amaral, Schumann & Wu Nordhal, 2008

Neurocostruttivismo e Specializzazione Interattiva




Karmiloff-Smith – Developmental disorders

Review

Development itself is the key to understanding developmental disorders

Annette Karmiloff-Smith

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NeuroPsicologia dell’Autismo

Autismo: teorie neurocognitive

- Dalle prime teorie di Bettelheim (1950) - *"Refrigerator mothers"*- alle moderne teorie che lo caratterizzano come un **disturbo neuroevolutivo.**

- **Teorie cognitive** correnti:

1. Teoria della mente (Baron-Cohen, 1985)
2. Deficit nelle funzioni esecutive (Hill, 2004)
3. Neuroni specchio (Williams et al., 2001)
4. Debole coerenza centrale (Frith, 1989)

Il mitico «Social Brian» implicato nella Cognizione Sociale!!!

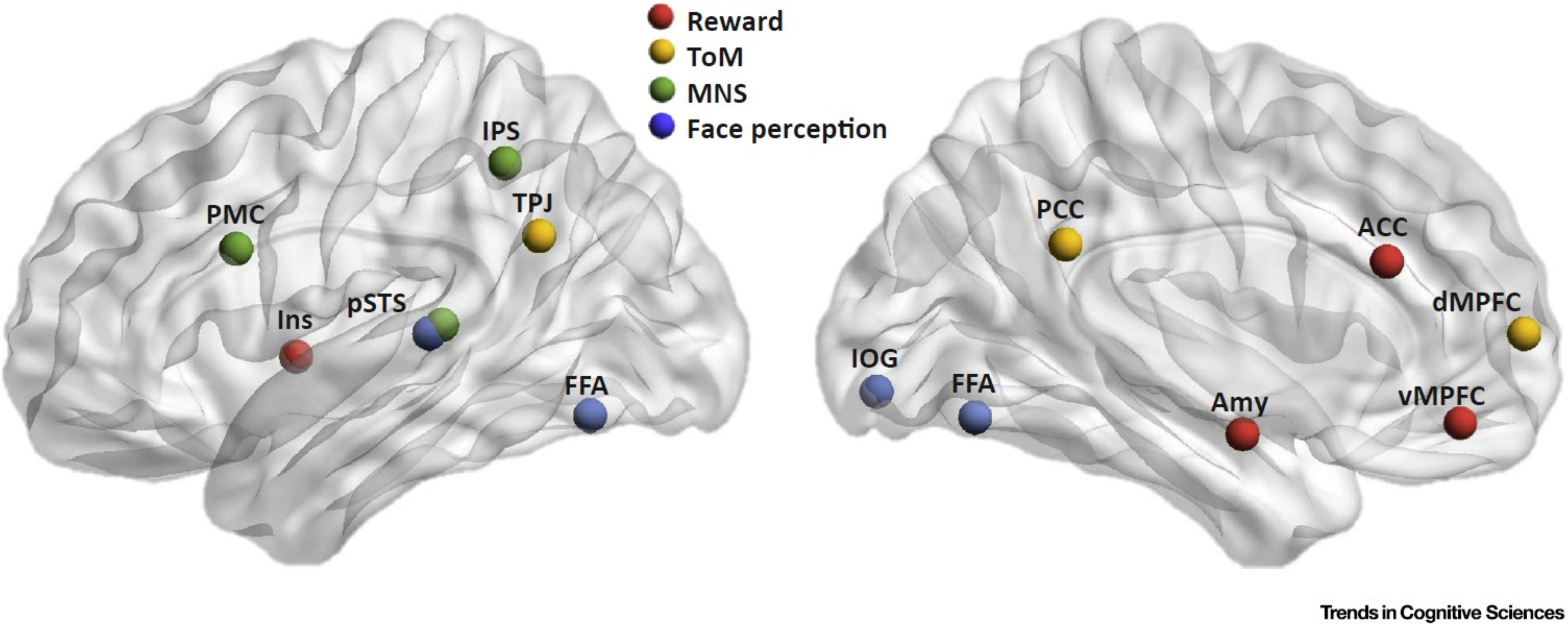
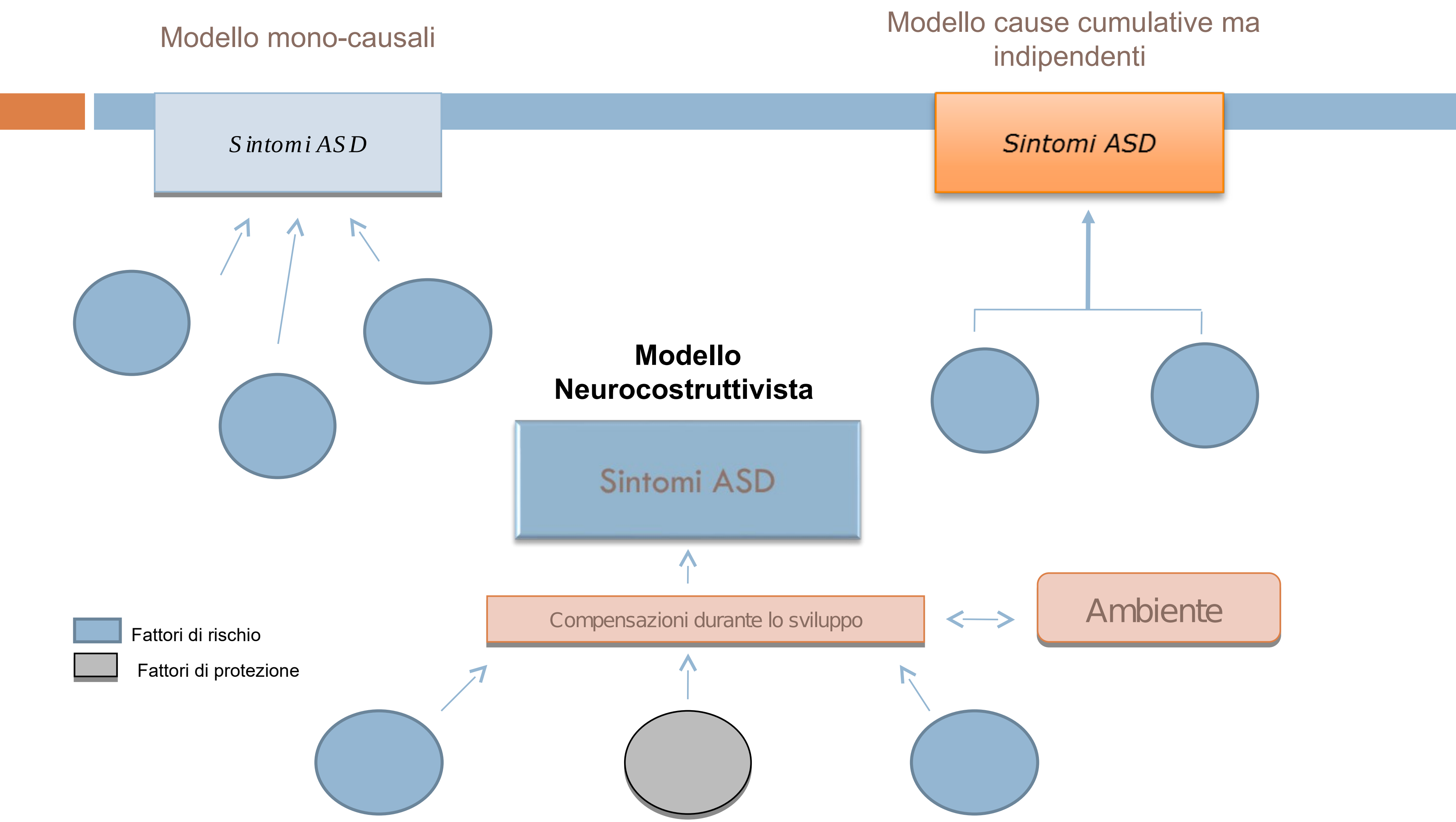


Figure 1. Social Brain Networks. Core networks known to be involved in social cognition. Only main network regions, simplified as spheres, are shown with approximate location (excluding subcortical structures). Abbreviations: ACC, anterior cingulate cortex; Amy, amygdala; dMPFC, dorsomedial prefrontal cortex; FFA, fusiform face area; Ins, insula; IOG, inferior occipital gyrus; IPS, intraparietal sulcus; MNS, mirror neuron system; PCC, posterior cingulate cortex; PMC, premotor cortex; pSTS, posterior superior temporal sulcus; ToM, theory of mind; TPJ, temporoparietal junction; vMPFC, ventromedial prefrontal cortex.



- *Gliga, T., Jones, E. J., Bedford, R., Charman, T., & Johnson, M. H. (2014)*
- *Johnson, M. H., Jones, E. J., & Gliga, T. (2015).*

La Teoria della Mente nell'autismo

É verificata empiricamente?

↓

Meta-analisi

Differisce a seconda del task utilizzato e dei costrutti misurati? ☺

Varia la sua sensibilità con lo sviluppo? ☹

Plausibile come possibile causa??? ☹

Task utilizzati nella meta-analisi:

- “Sally e Anne test”: compito di falsa credenza in cui un oggetto viene spostato da una persona durante l'assenza di un altro personaggio che conosce solo la posizione originale. Al bambino viene chiesto dove andrà a cercare l’oggetto nascosto il personaggio assente durante lo spostamento (diversa rappresentazione della realtà).

- “Smarties test” (o“M&M’s task”): simile al compito di “Sally & Anne”, ma viene utilizzato un tubo di Smarties contenente una penna invece che caramelle. Viene chiesto al bambino cosa potrebbe pensare la persona fuori dalla stanza rispetto al contenuto del tubo.

- “Strange story task”: vengono raccontate storie che richiedono di fare inferenze sugli stati mentali dei personaggi della storia. Questo compito comprende concetti come bugia e doppio bluff.

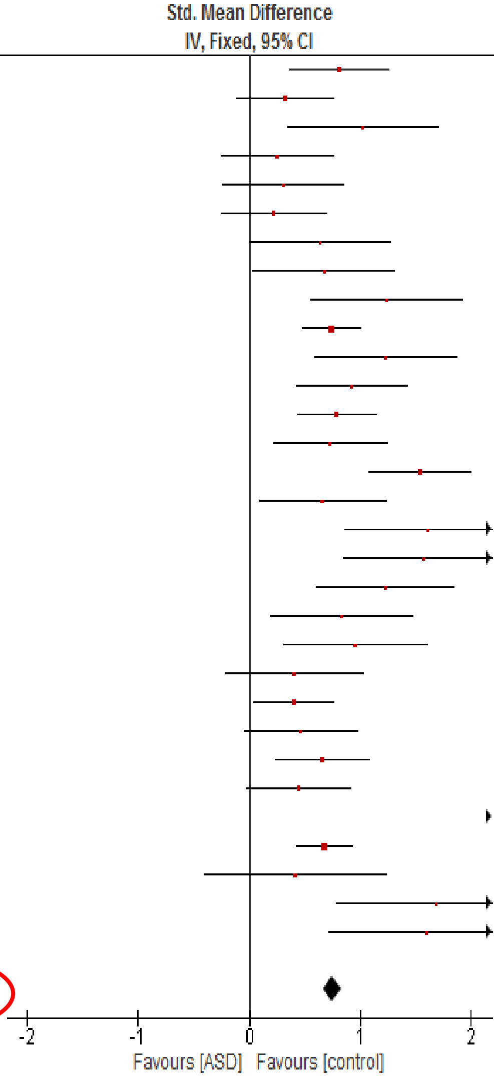
- “Reading the mind in the eyes test”: inferire gli stati mentali degli altri da una fotografia che rappresenta solo la zona degli occhi.

Risultati: meta-analisi totale e in funzione del paradigma utilizzato

Study or Subgroup	Std. Mean Difference	SE	Weight	Std. Mean Difference IV, Fixed, 95% CI
A. Spek, E.M. Scholte. 2010	0.8123	0.2263	3.9%	0.81 [0.37, 1.26]
A. Spek, E.M. Scholte. 2010	0.3245	0.2196	4.2%	0.32 [-0.11, 0.75]
C. Hughes, I. S. Boucaud, 1997	1.0269	0.3428	1.7%	1.03 [0.36, 1.70]
Candida C. Peterson, Virginia Slaughter. 2009	0.2538	0.2583	3.0%	0.25 [-0.25, 0.76]
Candida Peterson 2014	0.3075	0.279	2.6%	0.31 [-0.24, 0.85]
Candida Peterson, V. Slaughter, 2013	0.2207	0.2396	3.5%	0.22 [-0.25, 0.69]
Candida Peterson, Virginia P. Slaughter 2007	0.6379	0.3229	1.9%	0.64 [0.01, 1.27]
E. Brent, P. Rios, F. Happè, T. Charman. 2004	0.6753	0.3251	1.9%	0.68 [0.04, 1.31]
E. Brent, P. Rios, F. Happè, T. Charman. 2004	1.2377	0.3452	1.7%	1.24 [0.56, 1.91]
E. M. Whyte, K. E. Nelson, K. S. Scherfa 2014	0.7416	0.1318	11.6%	0.74 [0.48, 1.00]
E.A. Heerey, D. Keltner, L. M. Capps. 2003	1.2322	0.3227	1.9%	1.23 [0.60, 1.86]
Elizabeth Pellicano. 2007	0.9238	0.2538	3.1%	0.92 [0.43, 1.42]
F. Happè. 1995	0.792	0.1818	6.1%	0.79 [0.44, 1.15]
J.Russell, R. Saltmarsh, E. Hill. 1999	0.7319	0.2582	3.0%	0.73 [0.23, 1.24]
L. Colle, S. Baron-Cohen, J. Hill. 2007	1.5396	0.2349	3.6%	1.54 [1.08, 2.00]
L. K. Hanson, C. M. Atance. 2014	0.6598	0.2904	2.4%	0.66 [0.09, 1.23]
N. Adler, B. Nadler, Z. Eviatar. 2010	1.6077	0.3808	1.4%	1.61 [0.86, 2.35]
N. David, A. Gawronski, N.S. Santos. 2008	1.5765	0.3714	1.5%	1.58 [0.85, 2.30]
N. David, A. Gawronski, N.S. Santos. 2008	1.2281	0.3147	2.0%	1.23 [0.61, 1.84]
N. Kaland, K. Callesen, A. Møller-Nielsen. 2008	0.8314	0.3256	1.9%	0.83 [0.19, 1.47]
N. Kaland, K. Callesen, A. Møller-Nielsen. 2008	0.9549	0.3298	1.8%	0.95 [0.31, 1.60]
N. Kaland,A. Møller-Nielsen,L. Smith. 2005	0.4038	0.3156	2.0%	0.40 [-0.21, 1.02]
S. Begeer, D.M. Bernstein, J. van Wijhe. 2012	0.404	0.1814	6.1%	0.40 [0.05, 0.76]
S. E. Lind, D. M. Bowler. 2009	0.4651	0.2629	2.9%	0.47 [-0.05, 0.98]
S. E. Lind, D. M. Bowler. 2009	0.6628	0.2151	4.3%	0.66 [0.24, 1.08]
S. E. Lind, Dermot M. Bowler2009. (2)	0.4483	0.2383	3.5%	0.45 [-0.02, 0.92]
S. Sharma, L.M. Woolfson, S.C. Hunter. 2013	7.2569	0.8303	0.3%	7.26 [5.63, 8.88]
T. Jolliffe, S. Baron-Cohen. 1999	0.6748	0.1247	12.9%	0.67 [0.43, 0.92]
Yan Grace Lam , Siu-sze Susanna Yeung 2012	0.417	0.417	1.2%	0.42 [-0.40, 1.23]
Yan Grace Lam. 2013	1.6903	0.4629	0.9%	1.69 [0.78, 2.60]
Yan Grace Lam. 2013	1.6035	0.4532	1.0%	1.60 [0.72, 2.49]
Total (95% CI)			**100.0%**	**0.75 [0.66, 0.84]**

Heterogeneity: Chi² = 122.55, df = 30 (P < 0.00001); I² = 76%

Test for overall effect: Z = 16.78 (P < 0.00001)



Risultati: meta-analisi per fasce d’età cronologica

Forest plot fascia d’età Bambini (3-13 anni)

Study or Subgroup	Std. Mean Difference	SE	Weight	Std. Mean Difference IV, Fixed, 95% CI
C. Hughes, I. S. Boucaud, 1997	1.0269	0.3428	2.7%	1.03 [0.36, 1.70]
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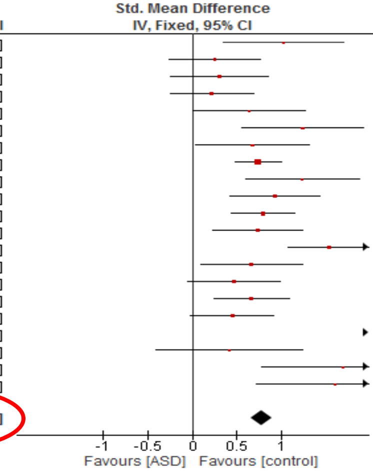
Yan Grace Lam. 2013	1.6903	0.4629	1.5%	1.69 [0.78, 2.60]
Yan Grace Lam. 2013	1.6035	0.4532	1.6%	1.60 [0.72, 2.49]
Total (95% CI)			**100.0%**	**0.78 [0.66, 0.89]**

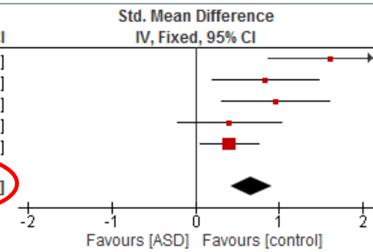
Heterogeneity: Chi² = 100.52, df = 20 (P < 0.00001); I² = 80%
Test for overall effect: Z = 13.66 (P < 0.00001)



Forest plot fascia d’età Adolescenti (13.1-22 anni)

Study or Subgroup	Std. Mean Difference	SE	Weight	Std. Mean Difference IV, Fixed, 95% CI
N. Adler, B. Nadler, Z. Eviatar. 2010	1.6077	0.3808	10.5%	1.61 [0.86, 2.35]
N. Kaland, K. Callesen, A. Møller-Nielsen. 2008	0.8314	0.3256	14.3%	0.83 [0.19, 1.47]
N. Kaland, K. Callesen, A. Møller-Nielsen. 2008	0.9549	0.3298	13.9%	0.95 [0.31, 1.60]
N. Kaland,A. Møller-Nielsen,L. Smith. 2005	0.4038	0.3156	15.2%	0.40 [-0.21, 1.02]
S. Begeer, D.M. Bernstein, J. van Wijhe. 2012	0.404	0.1814	46.1%	0.40 [0.05, 0.76]
Total (95% CI)			**100.0%**	**0.67 [0.43, 0.91]**

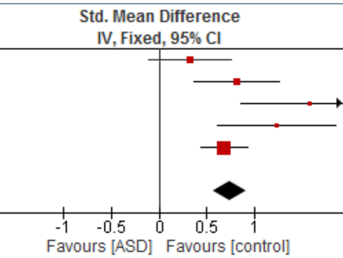
Heterogeneity: Chi² = 9.92, df = 4 (P = 0.04); I² = 60%
Test for overall effect: Z = 5.42 (P < 0.00001)



Forest plot fascia d’età Adulti (dai 22 anni)

Study or Subgroup	Std. Mean Difference	SE	Weight	Std. Mean Difference IV, Fixed, 95% CI
A. Spek, E.M. Scholte. 2010	0.3245	0.2196	17.0%	0.32 [-0.11, 0.75]
A. Spek, E.M. Scholte. 2010	0.8123	0.2263	16.0%	0.81 [0.37, 1.26]
N. David, A. Gawronski, N.S. Santos. 2008	1.5765	0.3714	5.9%	1.58 [0.85, 2.30]
N. David, A. Gawronski, N.S. Santos. 2008	1.2281	0.3147	8.3%	1.23 [0.61, 1.84]
T. Jolliffe, S. Baron-Cohen. 1999	0.6748	0.1247	52.7%	0.67 [0.43, 0.92]
Total (95% CI)			**100.0%**	**0.74 [0.56, 0.91]**

Heterogeneity: Chi² = 11.43, df = 4 (P = 0.02); I² = 65%
Test for overall effect: Z = 8.13 (P < 0.00001)

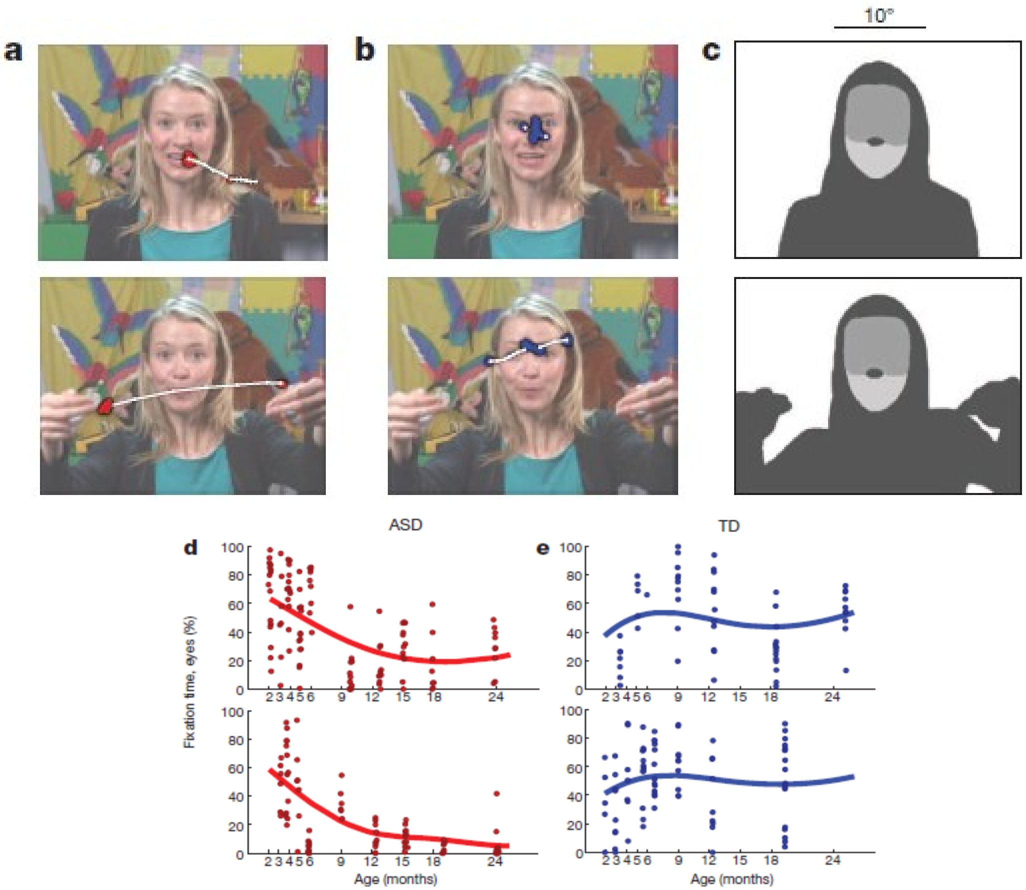


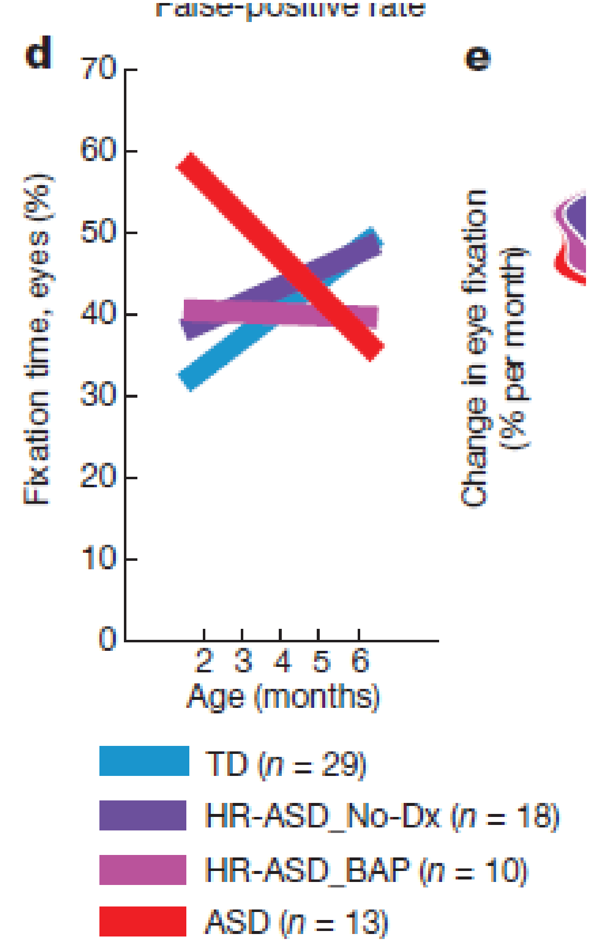
LETTER

doi:10.1038/nature12715

Attention to eyes is present but in decline in 2–6-month-old infants later diagnosed with autism

Warren Jones[1,2,3] & Ami Klin[1,2,3]

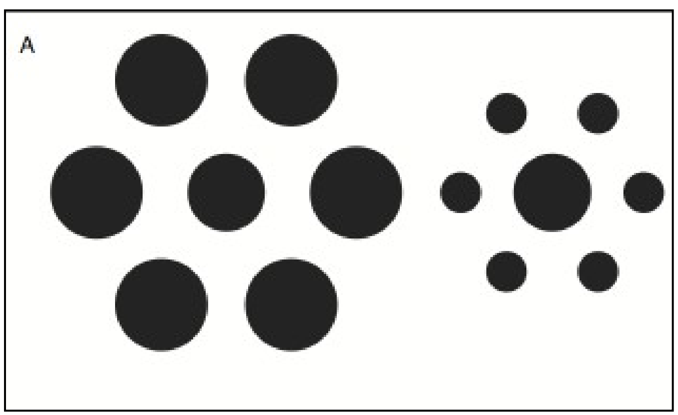




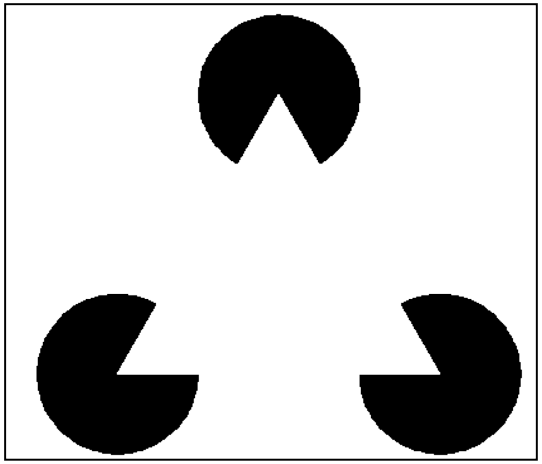
Teoria della Debole Coerenza Centrale

- **'Coerenza centrale'** (CC): tendenza a processare l'informazione dando importanza a contesto e significato globale, spesso a discapito dei dettagli.
- CC ovvero è presente in diverse funzioni cognitive (e.g., percezione, memoria, linguaggio, etc.)

Ebbinghaus-Titchener



Kanizsa

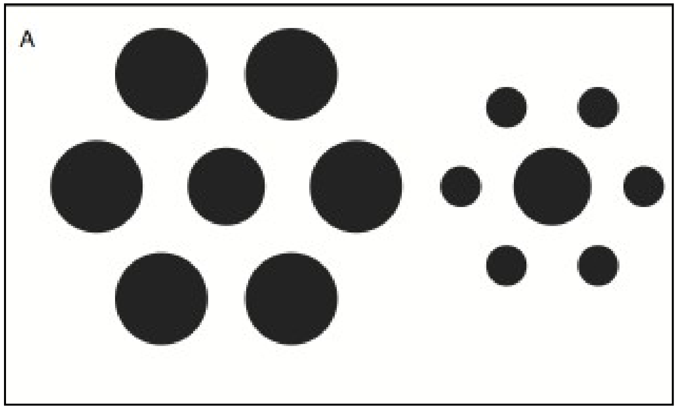


- Autismo sarebbe caratterizzato da una debole CC (o '**Bias Locale**'): stile percettivo orientato ai dettagli, che sacrifica la globalità dell'informazione.

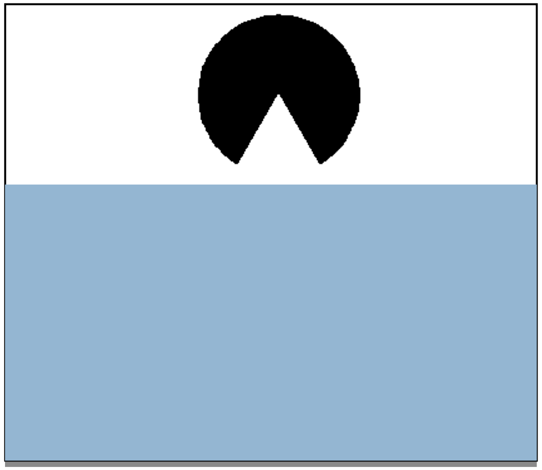
Teoria della Debole Coerenza Centrale

- ‘**Coerenza centrale**’ (CC): tendenza a processare l’informazione dando importanza a contesto e significato globale, spesso a discapito dei dettagli.
- CC ovvero è presente in diverse funzioni cognitive (e.g., percezione, memoria, linguaggio, etc.)

Ebbinghaus-Titchener



Kanizsa



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frontiers in Human Neuroscience

REVIEW
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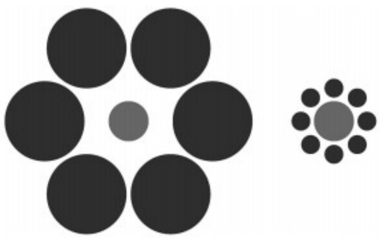
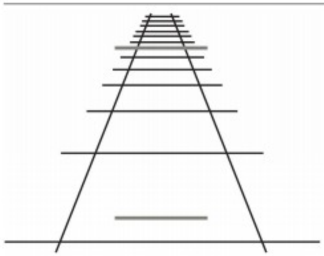
Visual Illusions: An Interesting Tool to Investigate Developmental Dyslexia and Autism Spectrum Disorder

Simone Gori[1,2], Massimo Molteni[2] and Andrea Facoetti[2,3]*

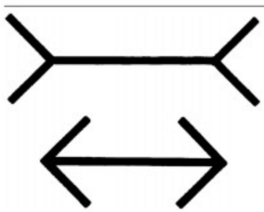
[1] Department of Human and Social Sciences, University of Bergamo, Bergamo, Italy, [2] Child Psychopathology Unit, Scientific Institute, IRCCS Eugenio Medea, Bosisio Parini, Italy, [3] Developmental and Cognitive Neuroscience Lab, Department of General Psychology, University of Padova, Padua, Italy



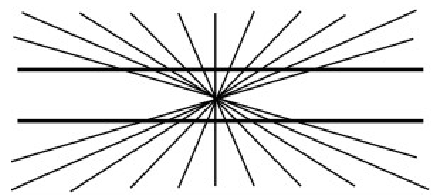
The **Ebbinghaus illusion** (Ebbinghaus, 1902) is a size illusion composed by two circles of identical size that are placed near to each other, while one is surrounded by large circles the other is surrounded by small circles. The central circle surrounded by large circles appears smaller than the one surrounded by small circles.



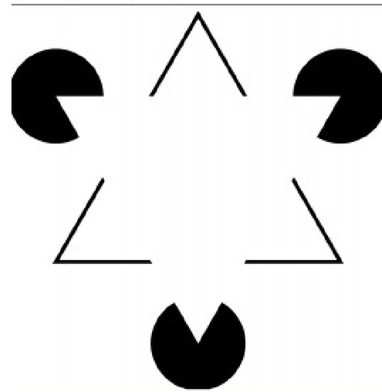
The Ponzo illusion (Ponzo, 1911) is characterized by two identical lines (light gray horizontal lines in the example above) across a pair of converging lines that could resemble railway tracks. The upper line is normally perceived longer probably because the converging lines are automatically interpreted as depth cues by the visual system. Consequently, the upper line is considered by the visual system as it was farther away, and then perceived longer: a further object would have to be bigger than a nearer one when both are producing two retinal images of the same size.



The **Müller-Lyer illusion** (Müller-Lyer, 1889) is commonly represented as two lines of equal length with arrow-like terminators called fins. One line has the fins pointing inward and it is perceived to be longer than the line with the fins pointing outward.



The **Hering illusion** (Hering, 1861) is observed in pattern composed by two straight and parallel lines superimposed on a radial background. The lines are perceived as bowing outward.



The **Kanizsa triangle** (Kanizsa, 1955) is the most famous pattern exhibiting illusory contour. This pattern is composed by trigger Pac-Man-shaped aligned. The Kanizsa pattern evokes the percept of a triangle, defined by a sharp illusory contour although no physical triangle is present in the stimulus. Moreover, the illusory triangle appears brighter than a background of the same luminance. Finally, the illusory triangle is perceived closer to the observer than the inducers.

frontiers in Human Neuroscience

REVIEW
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CrossMark

Visual Illusions: An Interesting Tool to Investigate Developmental Dyslexia and Autism Spectrum Disorder

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TABLE 3 | Overview of the published articles investigating visual illusions sensitivity in autism spectrum disorder (ASD).

Reference	Visual illusion	Main results (i.e., illusion sensitivity)
Happé, 1996	Ebbinghaus, Ponzo, Müller-Lyer, Poggendorff, Hering illusions, and Kanizsa triangle	ASD < in comparison to both Controls and children with learning difficulties
Ropar and Mitchell, 1999	Ebbinghaus, Ponzo, Müller-Lyer, and vertical-horizontal illusions	ASD = in comparison to both Controls and children with moderate learning difficulties
Ropar and Mitchell, 2001	Ebbinghaus, Ponzo, Müller-Lyer, and vertical-horizontal illusions	ASD = in comparison to both Controls and children with moderate learning difficulties
Hoy et al., 2004	Ebbinghaus, Ponzo, Müller-Lyer, Poggendorff, Hering illusions, and Kanizsa triangle	ASD = Controls
Rouse et al., 2004	Thatcher	ASD = Controls
Bölte et al., 2007	Ebbinghaus, Ponzo, Müller-Lyer, Poggendorff, Hering illusions, and Kanizsa triangle	High-functioning autism (HFA) < Controls
Stroganova et al., 2007	Illusory contours (ERP data)	ASD < Controls
Milne and Scope, 2008	Illusory contours	ASD = Controls
Walter et al., 2009	Ponzo and the Poggendorff	ASD < Controls
Mitchell et al., 2010	Shepard illusion	ASD < Controls
Chouinard et al., 2013	Ebbinghaus, the Ponzo Illusion, and the Müller-Lyer illusion.	ASD < Controls for the Müller-Lyer illusion

Evidenze della Debole Coerenza Centrale nei ASD

Developmental Psychology
2010, Vol. 46, No. 2, 530–544

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0012-1649/10/$12.00 DOI: 10.1037/a0018287

Individual Differences in Executive Function and Central Coherence Predict Developmental Changes in Theory of Mind in Autism

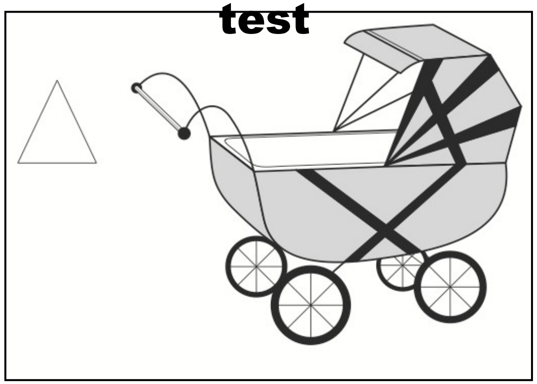
Elizabeth Pellicano
Institute of Education, London, and the University of Western Australia

There is strong evidence to suggest that individuals with autism show atypicalities in multiple cognitive domains, including theory of mind (ToM), executive function (EF), and central coherence (CC). In this study, the longitudinal relationships among these 3 aspects of cognition in autism were investigated. Thirty-seven cognitively able children with an autism spectrum condition were assessed on tests targeting ToM (false-belief prediction), EF (planning ability, cognitive flexibility, and inhibitory control), and CC (local processing) at intake and again 3 years later. Time 1 EF and CC skills were longitudinally predictive of change in children's ToM test performance, independent of age, language, nonverbal intelligence, and early ToM skills. Predictive relations in the opposite direction were not significant, and there were no developmental links between EF and CC. Rather than showing problems in ToM, EF and CC as co-occurring and independent atypicalities in autism, these findings suggest that early domain-general skills play a critical role in shaping the developmental trajectory of children's ToM.

Keywords: autism, longitudinal, theory of mind, executive function, central coherence

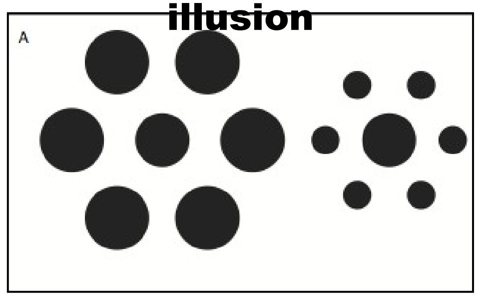
Percezione visiva nel ASD: punti di forza e debolezza

Embedded figure test



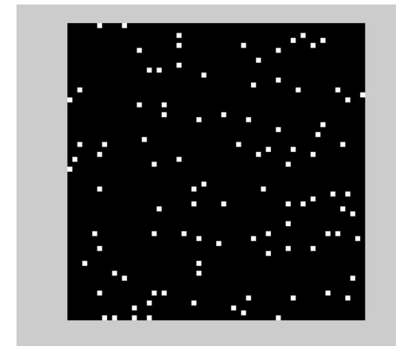
Joliffe & Baron-Cohen, 1997

Ebbinghaus illusion



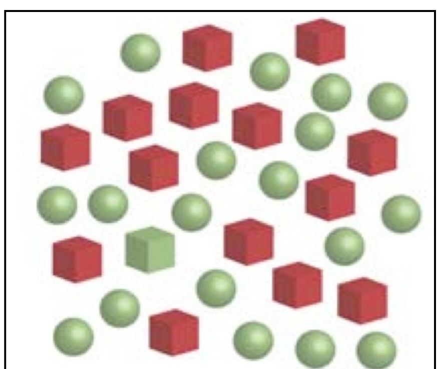
Happé, 1999

Coherent Dot



Grinter et al., 2010

Visual Search



O'Riordan et al.,2001

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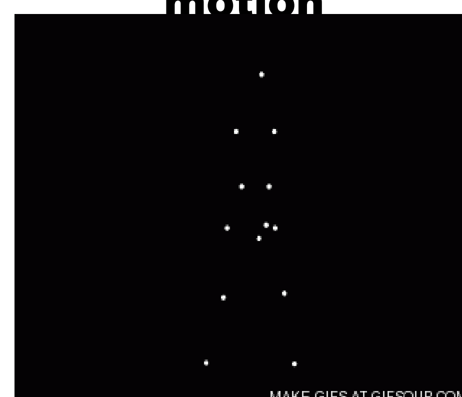
Biological motion



Klin et al., 2009

Current Biology

Enhanced Visual Search in Infancy Predicts Emerging Autism Symptoms

Highlights

- We measured visual search abilities in infants at familial risk for autism
- Enhanced visual search at 9 months predicted a higher level of autism symptoms at 2 years
- Atypical perception is intrinsically linked to the emerging autism phenotype

Authors

Teodora Gliga, Rachael Bedford, Tony Charman, Mark H. Johnson, The BASIS Team

Correspondence

t.gliga@bbk.ac.uk

In Brief

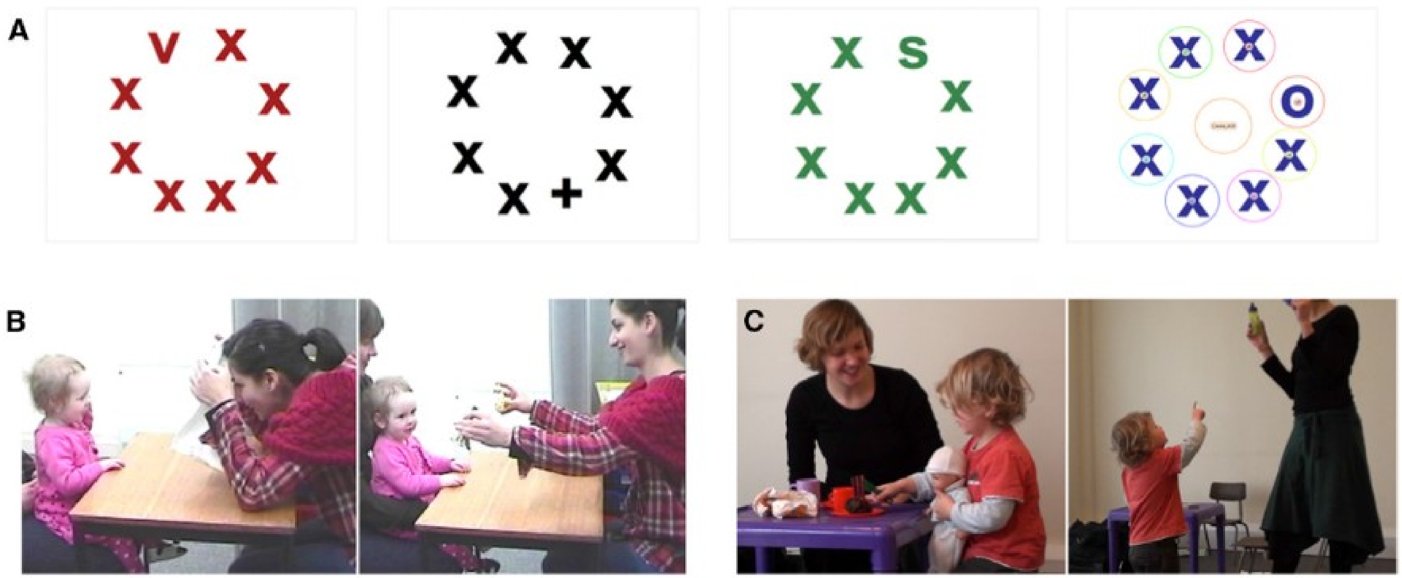


Figure 1. Study Design, Stimuli, and Behavioral Assessments
(A) Example stimuli and the areas of interest (AOIs) used in analysis.
(B) Example of behaviors assessed with the AOSI (e.g., anticipation of social contact, attention shifting).
(C) Example of behaviors assessed with the ADOS (e.g., pretend play, pointing).

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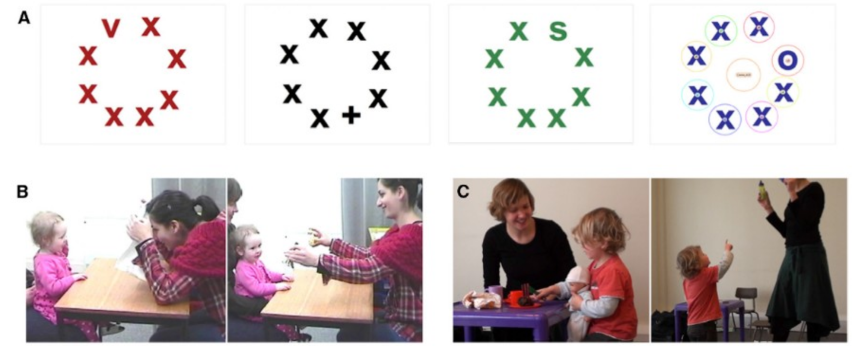

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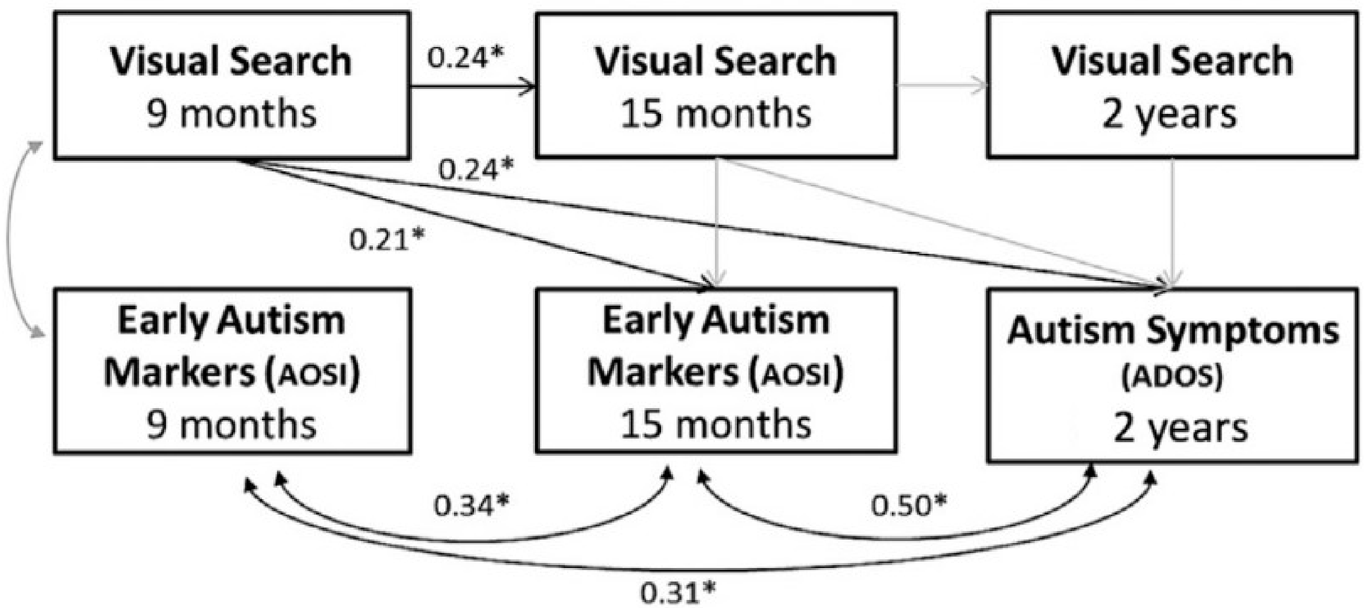


Figure 2. Relationship between Visual Search and Emerging Autism Symptoms

Visual search performance at 9 months predicts later autism symptom severity in an autoregressive model. Standardized coefficient values are presented for significant results (represented as black arrows).

Studio dell’attenzione visiva nei disturbi dello spettro autistico

Attenzione e Autismo?
Ma cosa c'entra!!!

Neuroscience and Biobehavioral Reviews 37 (2013) 164–183

Contents lists available at SciVerse ScienceDirect

Neuroscience and Biobehavioral Reviews

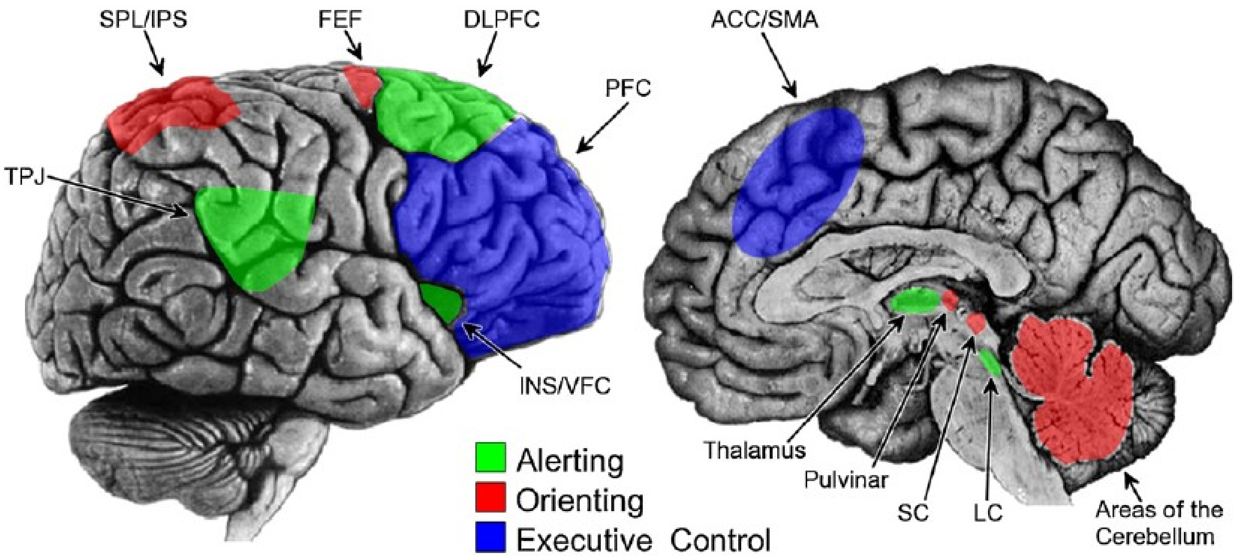
journal homepage: www.elsevier.com/locate/neubiorev

Review

Atypical attentional networks and the emergence of autism

Brandon Keehn[a,b,*], Ralph-Axel Müller[c], Jeanne Townsend[d]

[a] Laboratories of Cognitive Neuroscience, Division of Developmental Medicine, Boston Children's Hospital, Boston, MA, United States
[b] Harvard Medical School, Boston, MA, United States
[c] Brain Development Imaging Laboratory, Department of Psychology, San Diego State University, San Diego, CA, United States
[d] Research on Agi



Quale può essere il fattore alla base del bias locale? (3)

CORTEX 49 (2013) 1025–1033

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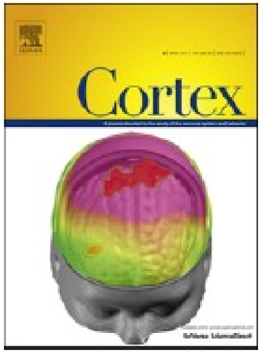


Research report

Zoom-out attentional impairment in children with autism spectrum disorder

Luca Ronconi [a], *Simone Gori* [a,b], *Milena Ruffino* [b], *Massimo Molteni* [b] *and Andrea Facoetti* [a,b,*]

La nostra ricerca: partecipanti

Ma come funziona lo zoom-in e lo zoom-out dell'attenzione negli individui affetti da un ASD?

- 11 partecipanti con diagnosi di disturbo dello spettro autistico (ASD; 8 Sindrome di Asperger e 3 Autismo ad alto funzionamento) reclutati presso IRCSS "E. Medea" di Bosisio Parini (LC);

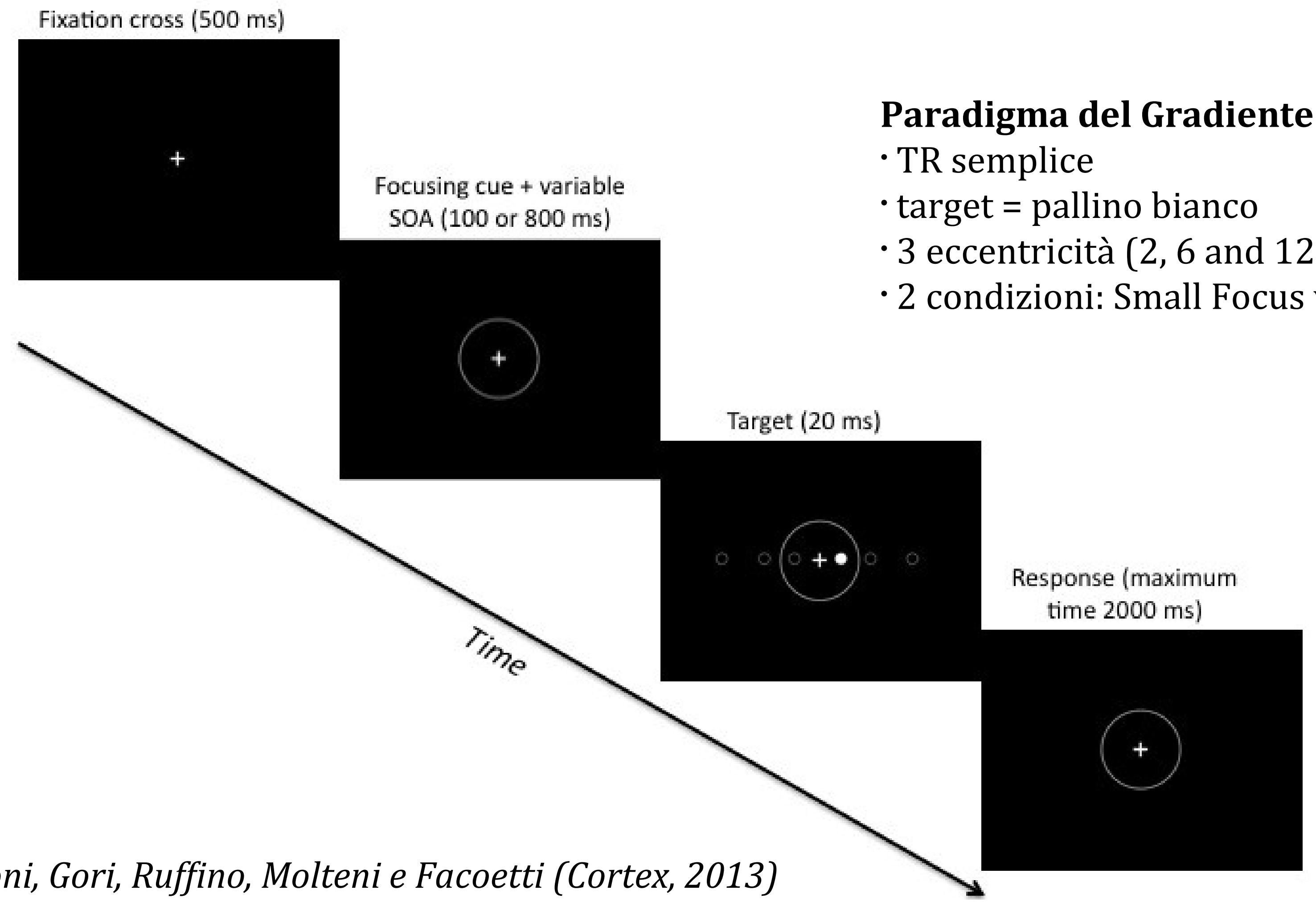
- 12 partecipanti con sviluppo tipico (TD).

Table 1 – Descriptive statistics for ASD and TD groups (VIQ = verbal intelligence quotient, PIQ = performance intelligence quotient, TIQ = total intelligence quotient). Vocabulary, Similarities, Picture Completion, Block Design are subtests from WISC-R.

Measure	Group	
	ASD ($n = 11$)	TD ($n = 12$)
Mean age (±SD)	13.2 (±2.9)	13.4 (±2.8)
Gender	11 M	9 M
VIQ	107 (±16.4)	–
PIQ	103.2 (±14.4)	–
TIQ	105.9 (±16.8)	–
Vocabulary	9.09 (±3.42)	12.27 (±2.13)
Similarities	11.27 (±2.45)	12.43 (±1.4)
Picture Completion	11.45 (±3.36)	10.83 (±.9)
Block Design	11.18 (±3.68)	11.9 (±2.06)
ADOS		
– Communication	3.5 (±1.27)	–
– Social interaction	5 (±2.45)	–

Focus attentivo nel ASD: Zoom-in

Condizione Small Focus



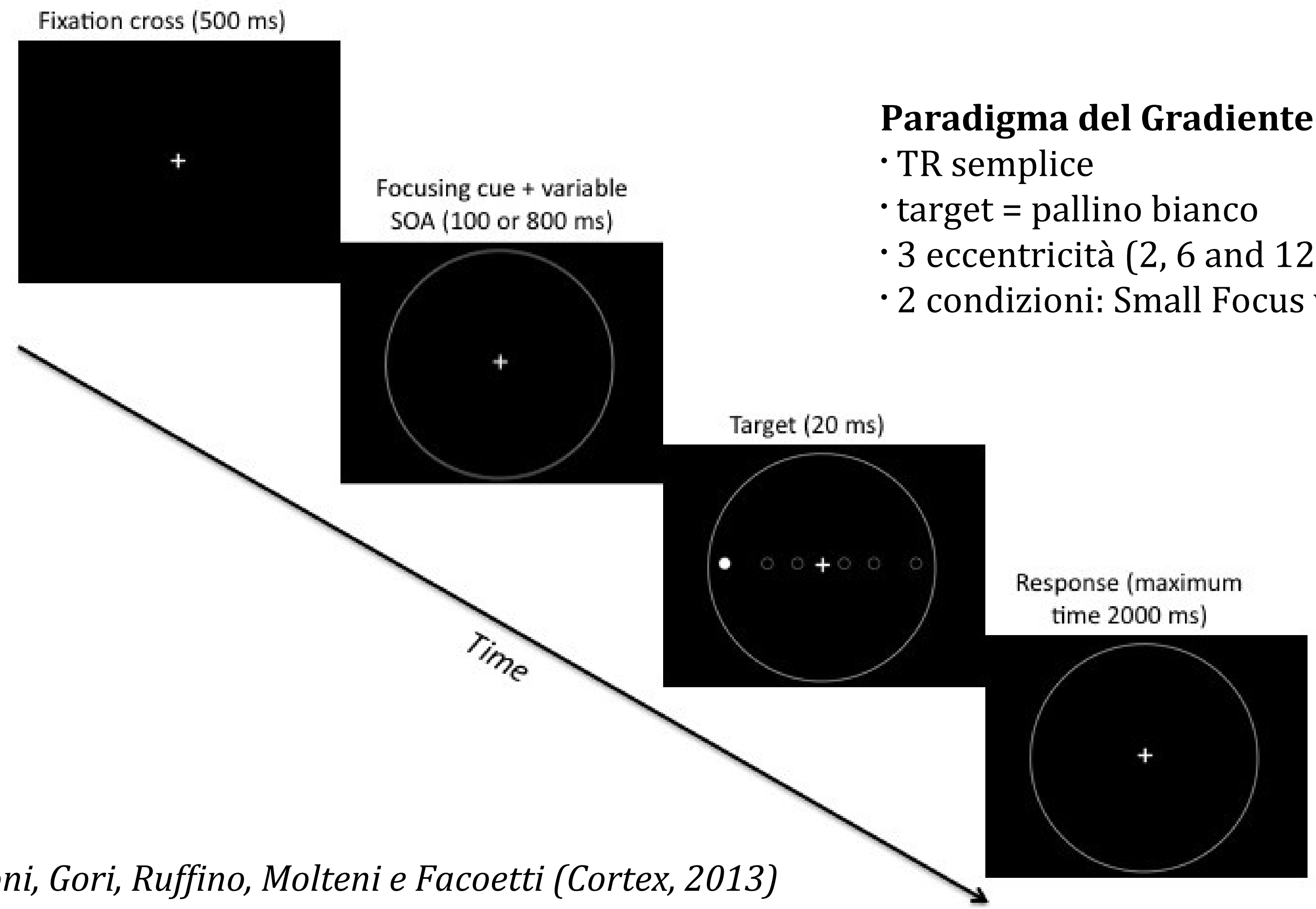
Paradigma del Gradiente Attenzionale:

- TR semplice
- target = pallino bianco
- 3 eccentricità (2, 6 and 12 g.a.v.)
- 2 condizioni: Small Focus vs. Large Focus

Ronconi, Gori, Ruffino, Molteni e Facoetti (Cortex, 2013)

Focus attentivo nel ASD: Zoom-out

Condizione Large Focus



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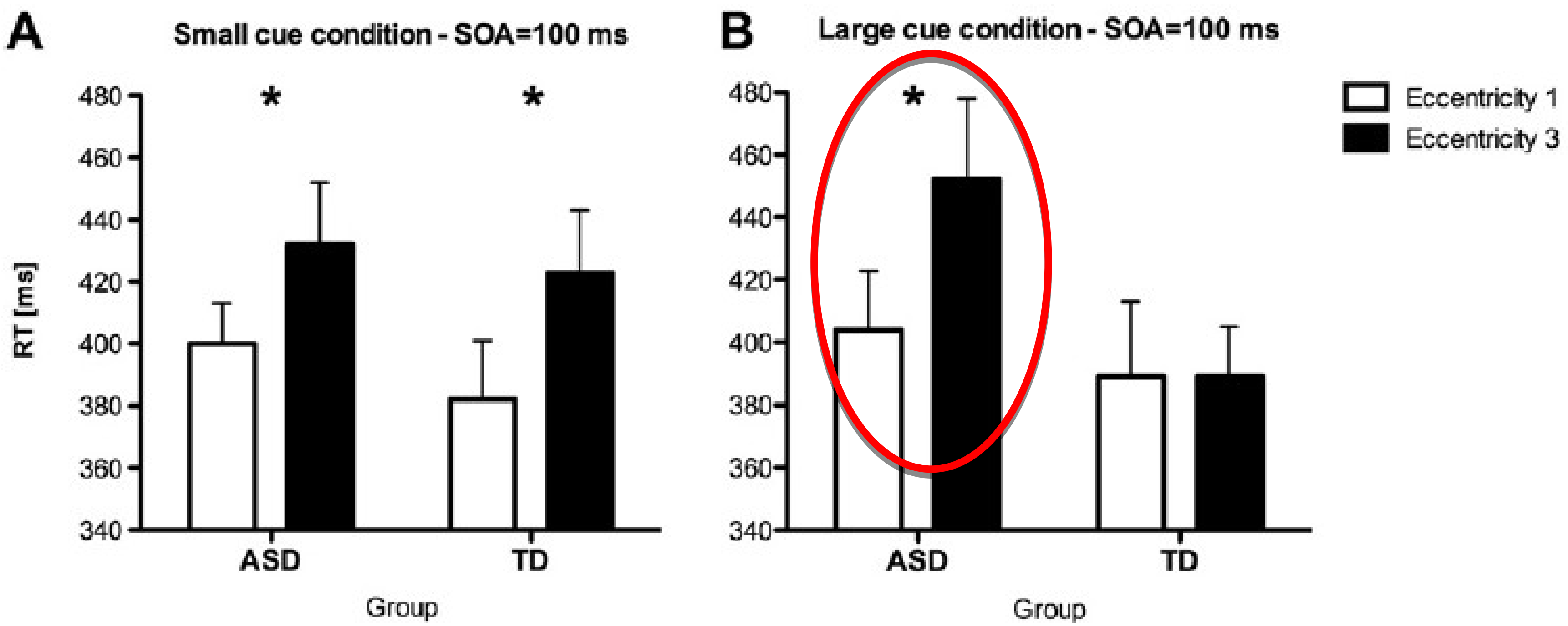
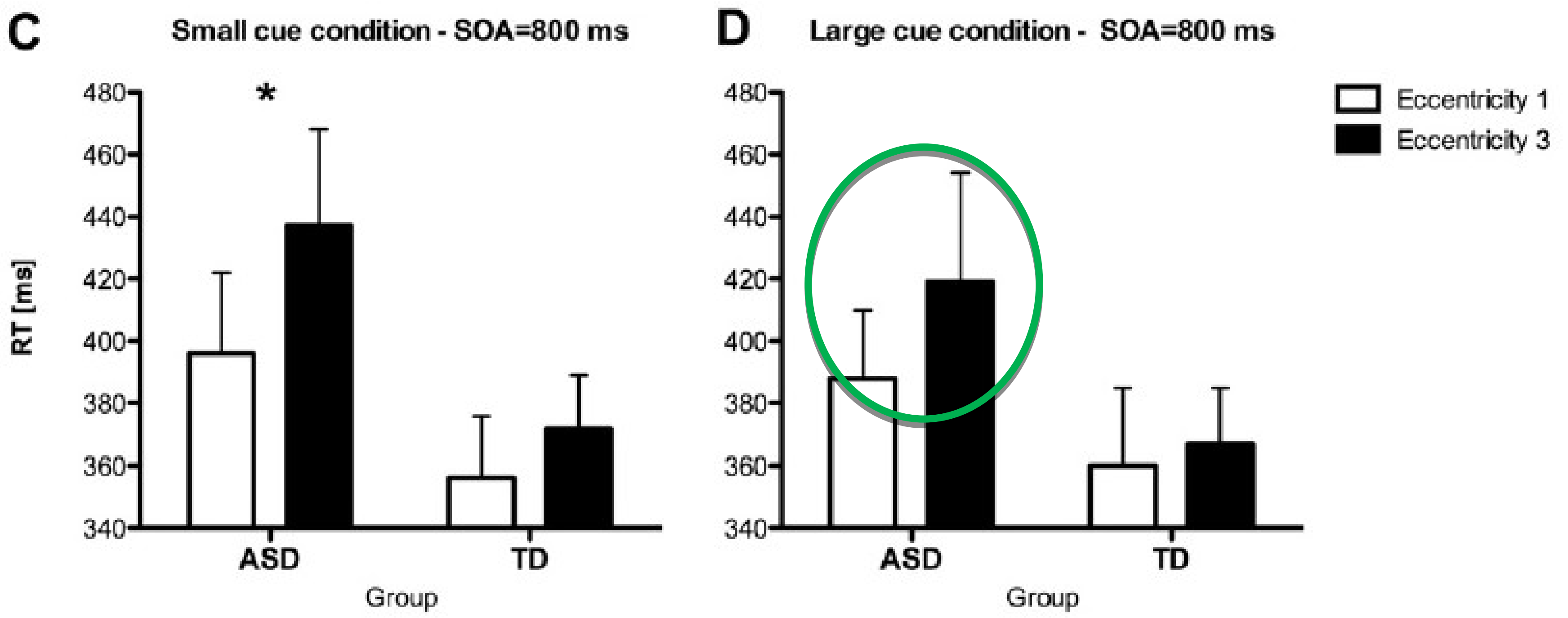
Ronconi, Gori, Ruffino, Molteni e Facoetti (Cortex, 2013)

Focus attentivo nel ASD: risultati (1)



Ronconi, Gori, Ruffino, Molteni e Facoetti (Cortex, 2013)

Focus attentivo nel ASD: risultati (2)



Ronconi, Gori, Ruffino, Molteni e Facoetti (Cortex, 2013)

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Decreased Coherent Motion Discrimination in Autism Spectrum Disorder: The Role of Attentional Zoom-Out Deficit

Luca Ronconi[1,¶], Simone Gori[1,2,¶], Milena Ruffino[2], Sandro Franceschini[1], Barbara Urbani[2], Massimo Molteni[2], Andrea Facoetti[1,2*]

1 Developmental and Cognitive Neuroscience Lab, Department of General Psychology, University of Padua, Padua, Italy, 2 Developmental Neuropsychology Unit, Scientific Institute "Eugenio Medea", Bosisio Parini, Italy

Abstract

Autism spectrum disorder (ASD) has been associated with decreased coherent dot motion (CDM) performance, a task that measures magnocellular sensitivity as well as fronto-parietal attentional integration processing. In order to clarify the role of spatial attention in CDM tasks, we measured the perception of coherently moving dots displayed in the central or peripheral visual field in ASD and typically developing children. A dorsal-stream deficit in children with ASD should predict a generally poorer performance in both conditions. In our study, however, we show that in children with ASD, CDM perception was selectively impaired in the central condition. In addition, in the ASD group, CDM efficiency was correlated to the ability to zoom out the attentional focus. Importantly, autism symptoms severity was related to both the CDM and attentional zooming-out impairment. These findings suggest that a dysfunction in the attentional network might help to explain decreased CDM discrimination as well as the "core" social cognition deficits of ASD.

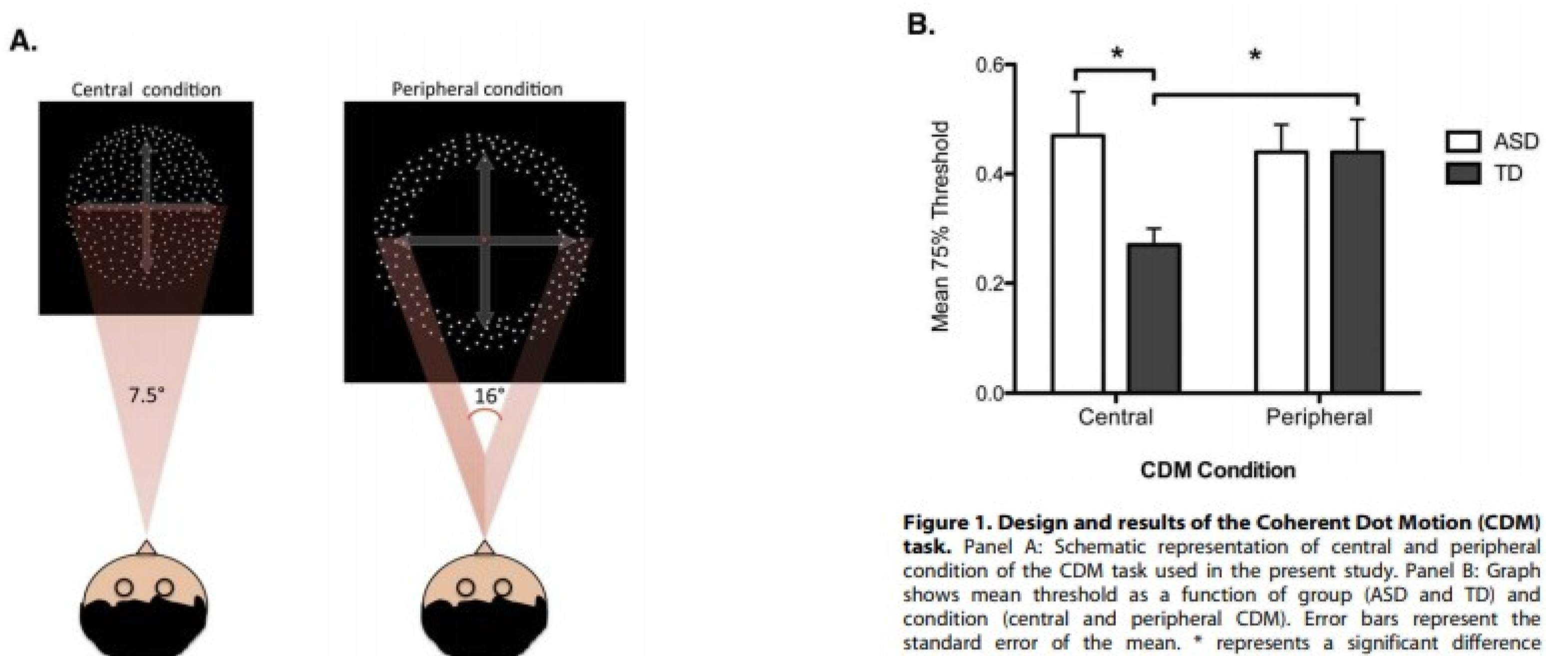

Figure 1. Design and results of the Coherent Dot Motion (CDM) task. Panel A: Schematic representation of central and peripheral condition of the CDM task used in the present study. Panel B: Graph shows mean threshold as a function of group (ASD and TD) and condition (central and peripheral CDM). Error bars represent the standard error of the mean. * represents a significant difference revealed by planned comparisons ($p < .05$).
doi:10.1371/journal.pone.0049019.g001

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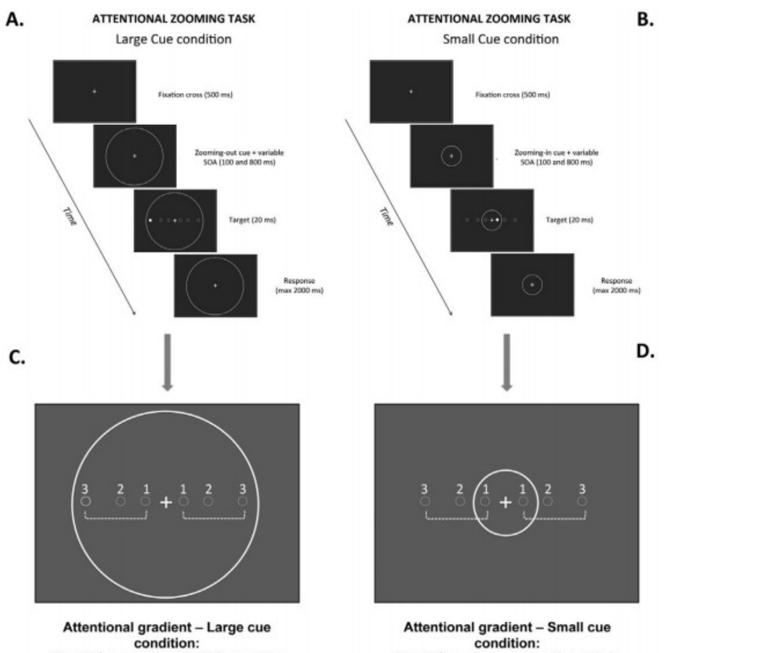

Figure 2. Design of the attentional zooming task. Panel A (large cue condition) and B (small cue condition) show the two types of trials in the attentional zooming task employed in Ronconi and colleagues. [30]. Panel C and D reported a schematic illustration of how the attentional gradient was computed (i.e., a measure of the zoom-in/zoom-out mechanism). The gradient effect in the large cue represents a measure of the ability to enlarge the attentional focus (zoom-out), whereas the gradient effect in the small cue represents a measure of the ability to narrow the attentional focus (zoom-in).
doi:10.1371/journal.pone.0049019.g002

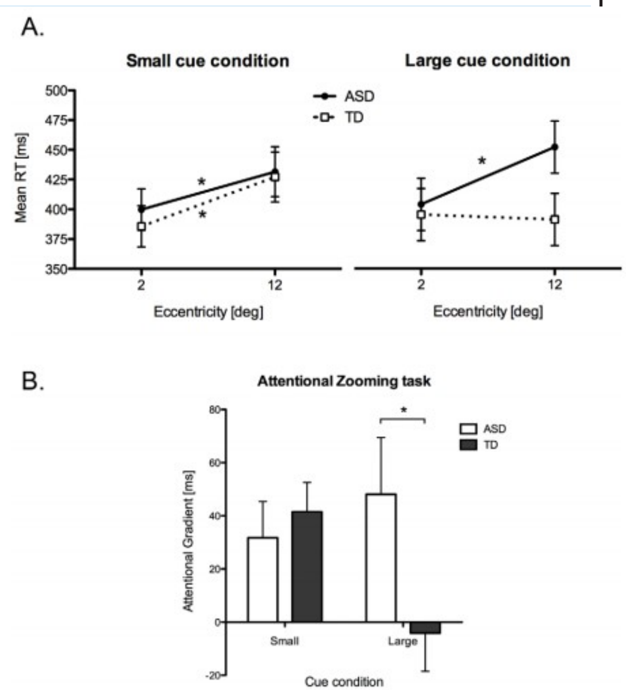

Figure 3. Results of the attentional zooming task showing: A) the mean reaction times as a function of cue size, eccentricity and group; B) the mean attentional gradient for ASD and TD groups as a function of cue size (large vs. small). Error bars represent the standard error of the mean and * indicates a significant difference revealed by planned comparisons.
doi:10.1371/journal.pone.0049019.g003

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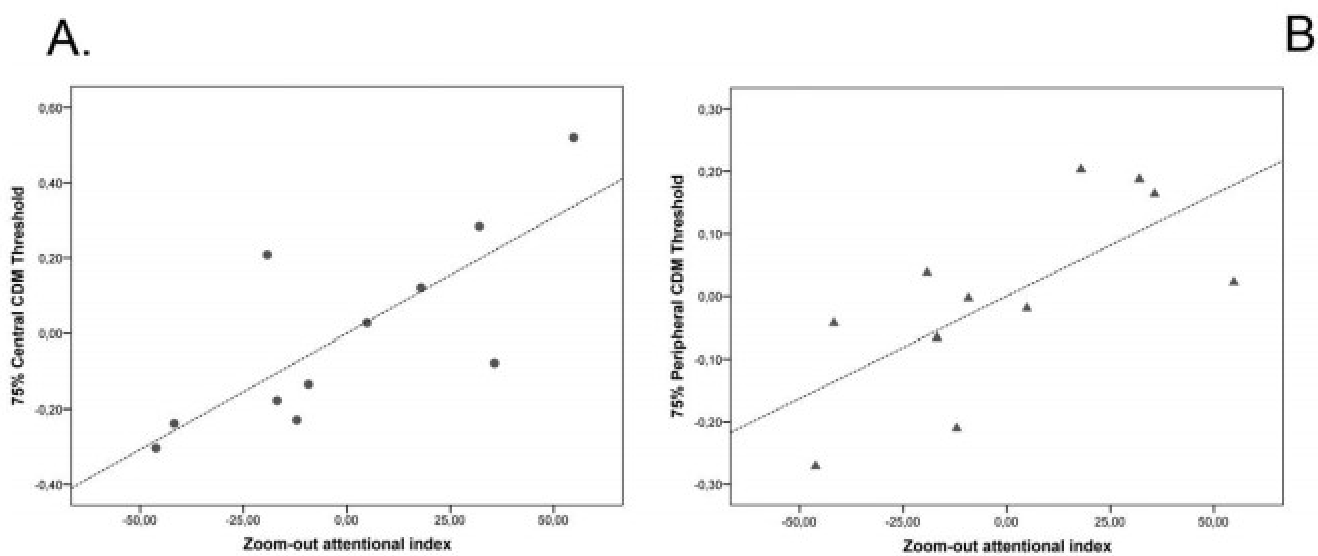

Figure 4. Partial correlation plot showing the relationship between central (Panel A) and peripheral (Panel B) CDM threshold and attentional gradient in large cue condition (i.e. zoom-out attentional index), controlled for age and performance IQ. Values on the x-axis represent the residuals of attentional zoom-out index. Values on the y-axis represent the residuals of threshold in the central CDM task.
doi:10.1371/journal.pone.0049019.g004

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Autism spectrum disorder (ASD) has been associated with decreased coherent dot motion (CDM) performance, a task that measures magnocellular sensitivity as well as fronto-parietal attentional integration processing. In order to clarify the role of spatial attention in CDM tasks, we measured the perception of coherently moving dots displayed in the central or peripheral visual field in ASD and typically developing children. A dorsal-stream deficit in children with ASD should predict a generally poorer performance in both conditions. In our study, however, we show that in children with ASD, CDM perception was selectively impaired in the central condition. In addition, in the ASD group, CDM efficiency was correlated to the ability to zoom out the attentional focus. Importantly, autism symptoms severity was related to both the CDM and attentional zooming-out impairment. These findings suggest that a dysfunction in the attentional network might help to explain decreased CDM discrimination as well as the "core" social cognition deficits of ASD.

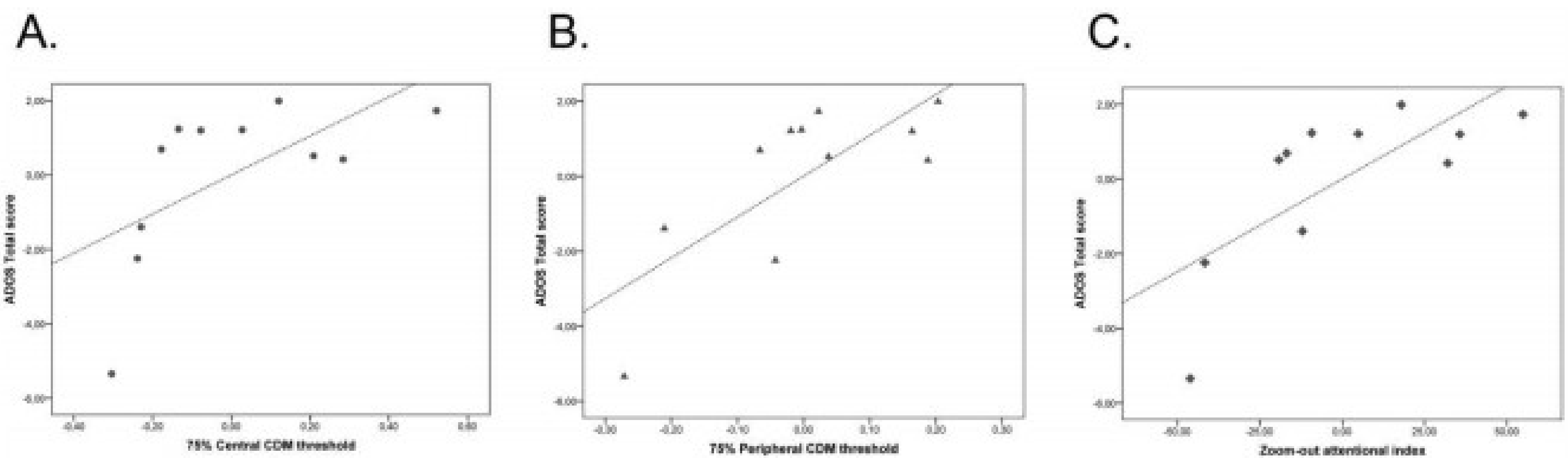


Figure 5. Partial correlation plots showing the relationship between the following: A) the threshold in the central CDM task and ADOS total interaction score; B) the threshold in the peripheral CDM task and ADOS total interaction score; C) the attentional zoom-out index and ADOS total interaction score. Values on the x-axis represent the residuals of central CDM threshold (Panel A), of peripheral CDM threshold (Panel B) and of attentional zoom-out index (Panel C). Values on the y-axis represent the residuals of ADOS total interaction score.
doi:10.1371/journal.pone.0049019.g005

Inducendo uno “attentional zooming” deficit

Cerebral Cortex Advance Access published October 9, 2012

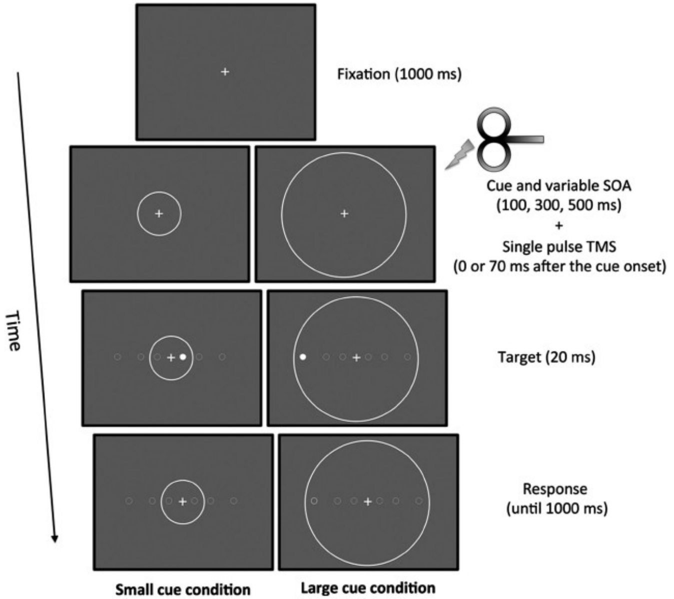
Cerebral Cortex
doi:10.1093/cercor/bhs319

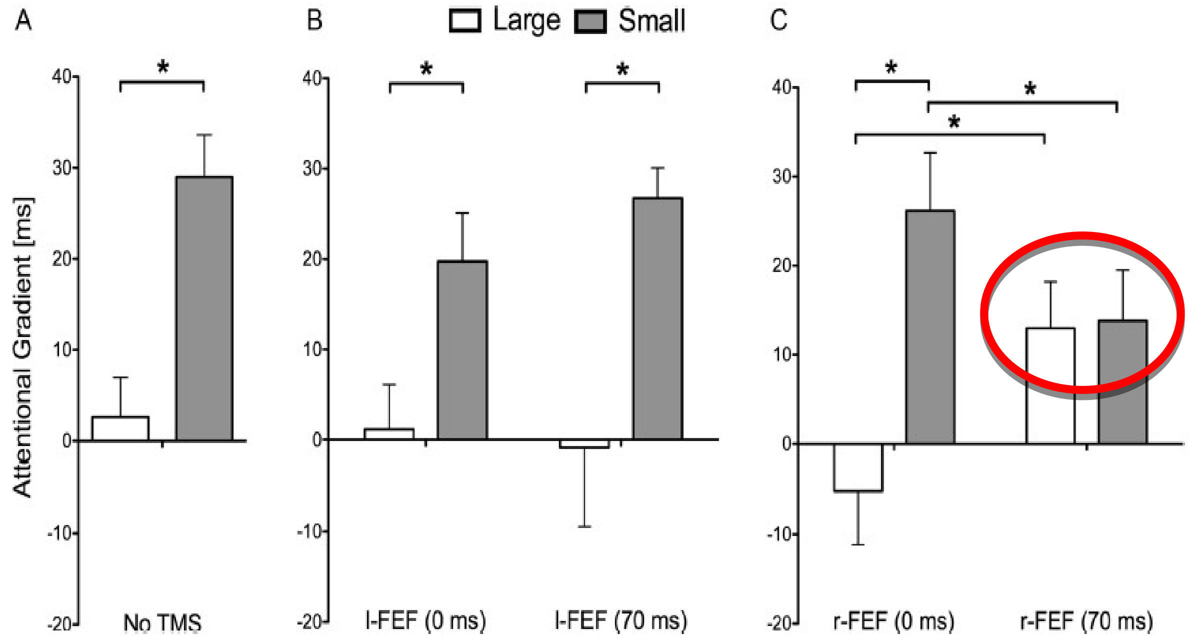
TMS on Right Frontal Eye Fields Induces an Inflexible Focus of Attention

Luca Ronconi[1], Demis Basso[2], Simone Gori[1,3] and Andrea Facoetti[1,3]

[1]Developmental and Cognitive Neuroscience Laboratory, Department of General Psychology, University of Padua, Italy [2]Faculty of Education, Free University of Bozen-Bolzano, Italy [3]Developmental Neuropsychology Unit, Scientific Institute “E. Medea”, Bosisio Parini, Lecco, Italy

Address correspondence to Dr Andrea Facoetti, Dipartimento di Psicologia Generale, Università di Padova, via Venezia 8, 35131 Padova, Italy. Email: andreafacoetti@unipd.it





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Deeper attentional masking by lateral objects in children with autism

Luca Ronconi [a], Simone Gori [a,b], Enrico Giora [c], Milena Ruffino [b], Massimo Molteni [b], Andrea Facoetti [a,b,*]

[a] Developmental and Cognitive Neuroscience Lab, Department of General Psychology, University of Padova, Italy
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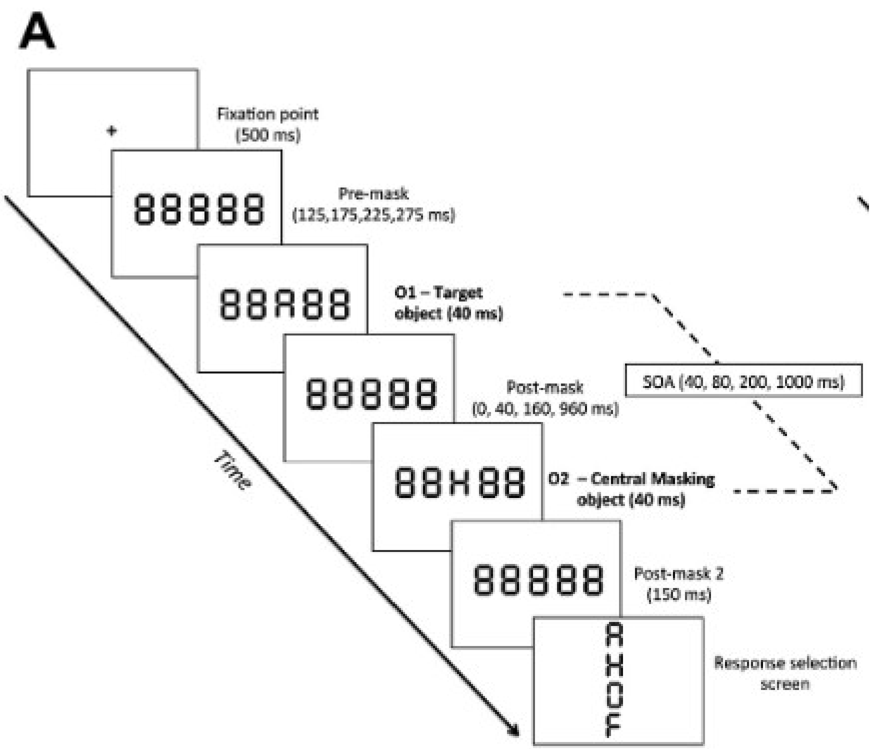
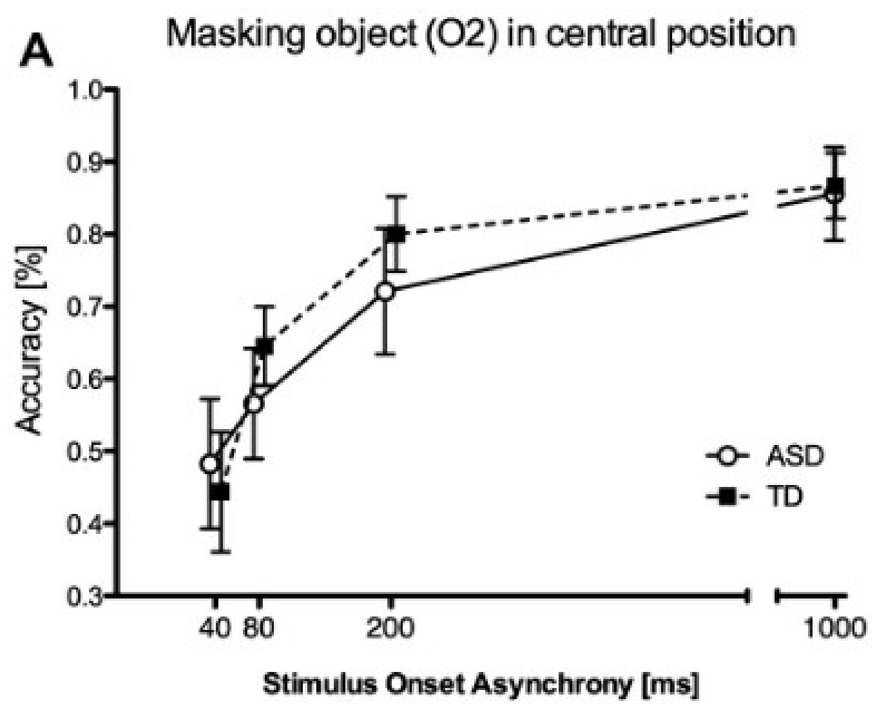
[c] Department of Psychology, University of Milano-Bicocca, Italy





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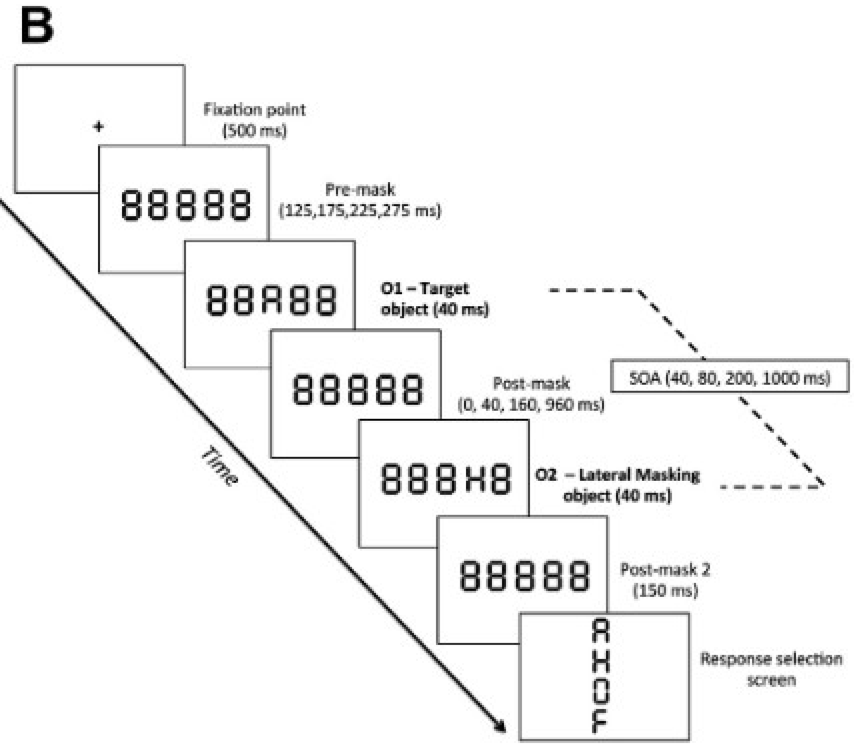
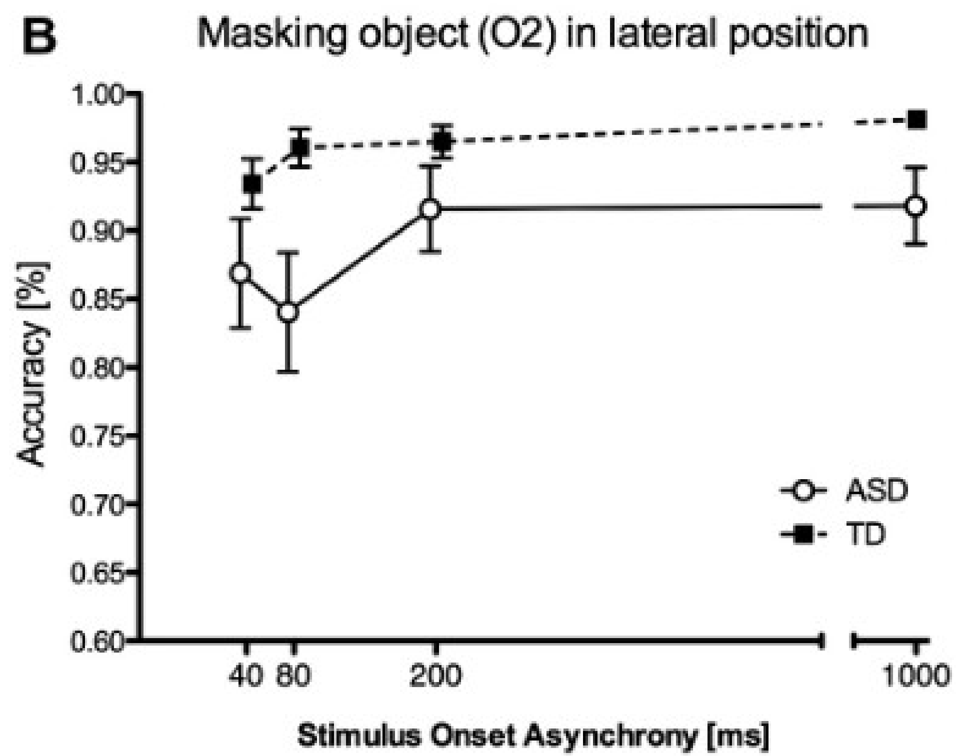
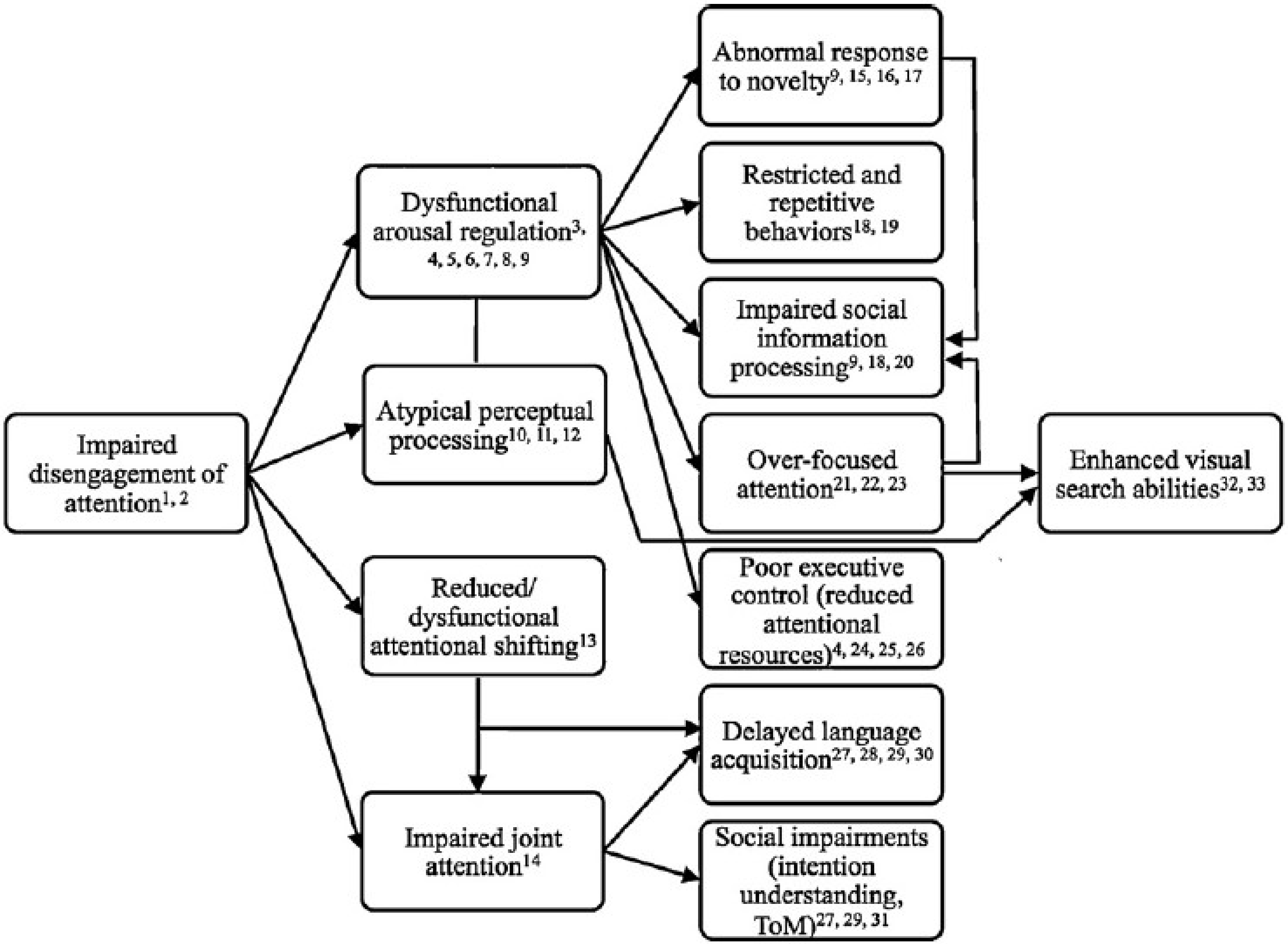




Attenzione e Autismo?
Ohh cavolo… forse c'entra qualcosa!!!



Neuroscience and Biobehavioral Reviews 47 (2014) 559–577

Contents lists available at ScienceDirect

Neuroscience and Biobehavioral Reviews

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Review

Impairments to visual disengagement in autism spectrum disorder: A review of experimental studies from infancy to adulthood

Lori-Ann R. Sacrey[a,*], Vickie L. Armstrong[c], Susan E. Bryson[b,c], Lonnie Zwaigenbaum[a,d]

[a] *Department of Pediatrics, University of Alberta, Edmonton, AB, Canada*
[b] *Departments of Pediatrics and Psychology, Dalhousie University, Halifax, NS, Canada*
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ABSTRACT

Impairments in visual disengagement are a current focus of research in autism spectrum disorders (ASD) and may play a key role in the early expression of social–emotional deficits associated with the disorder. This review summarizes current knowledge of visual disengagement and orienting in ASD. Convergent reports from infancy to adulthood indicate that (1) impairments to visual disengagement are apparent on Gap–Overlap tasks, spatial orienting tasks, and tasks involving social stimuli; and (2) these impairments emerge in the first year of life and continue into adulthood. The relationships between visual disengagement, orienting, joint attention, emotional regulation, and IQ are discussed in relation to ASD.

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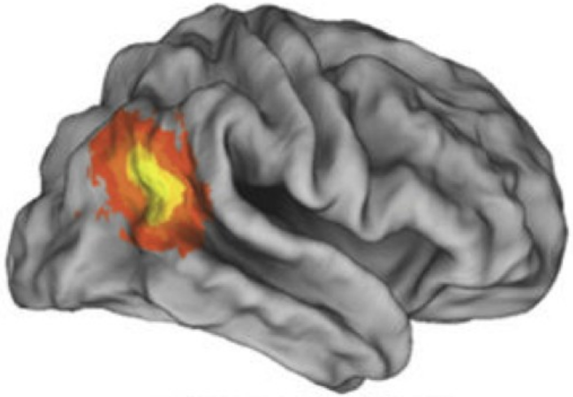
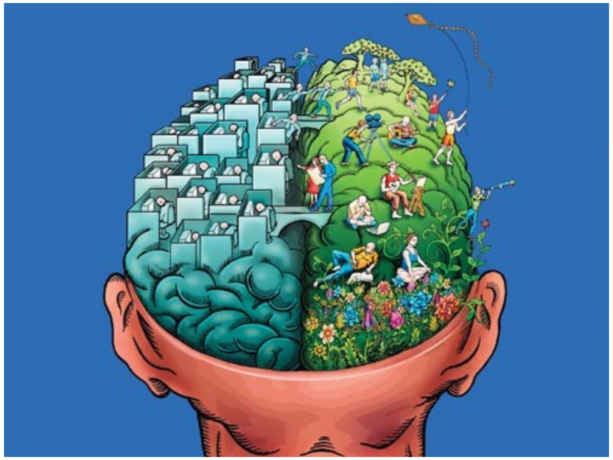
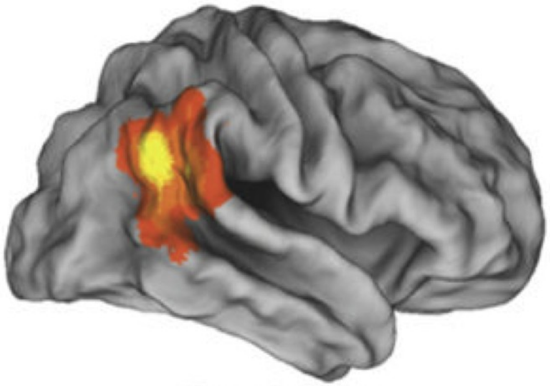
Disancoraggio dell'attenzione visiva???

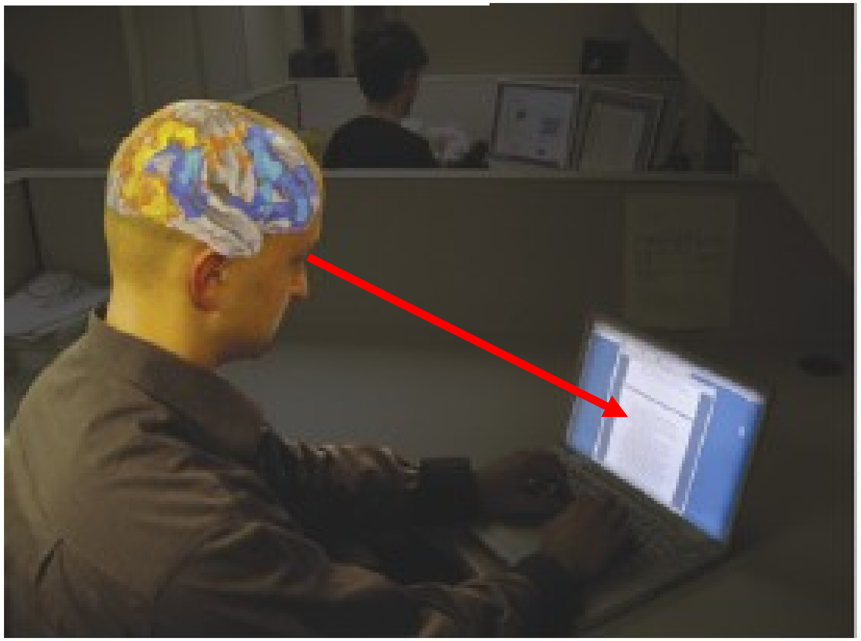


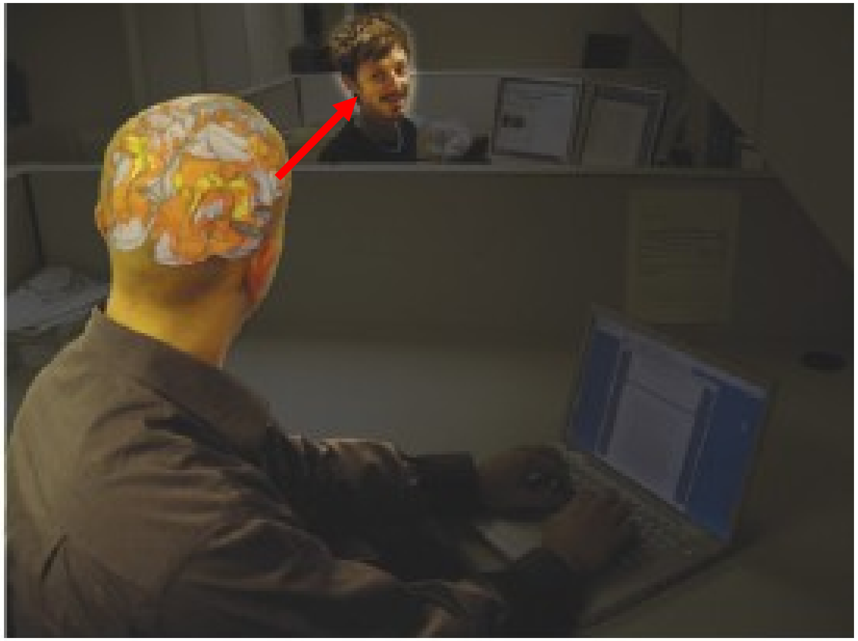
Theory of Mind





Reorienting





Come funziona lo "spotlight" dell'attenzione nei ASD?

DEFICIT DI DISANCORAGGIO

Una volta orientata l'attenzione in una specifica posizione/oggetto, individui affetti da un ASD mostrano un deficit (ritardo) nel ri-orientare l'attenzione in un'altra posizione/oggetto.

(Courchesne et al., 1994; Casey et al. 1993; Wainwright-Sharp and Bryson, 1993; Landry & Bryson, 2004)

ARCHIVAL REPORT

Disengagement of Visual Attention in Infancy Is Associated with Emerging Autism in Toddlerhood

Mayada Elsabbagh, Janice Fernandes, Sara Jane Webb, Geraldine Dawson, Tony Charman, Mark H. Johnson, and The British Autism Study of Infant Siblings Team

Il deficit di disancoraggio è presente anche in infanti a rischio, che successivamente in età prescolare saranno diagnosticati con un ASD? (Elsabbagh et al., 2013; Sacrey et al., 2013)

Come funziona lo "spotlight" dell'attenzione nei ASD?

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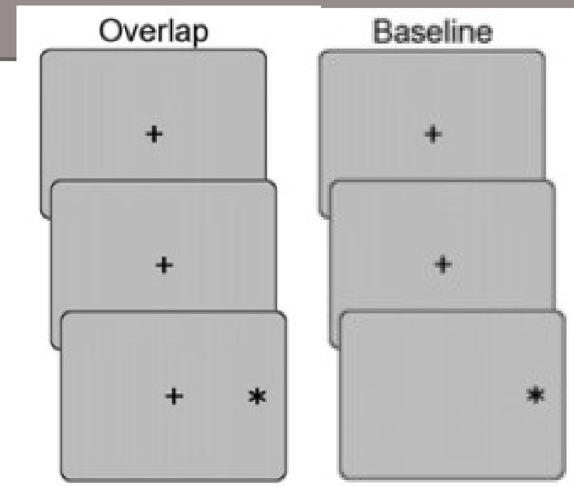
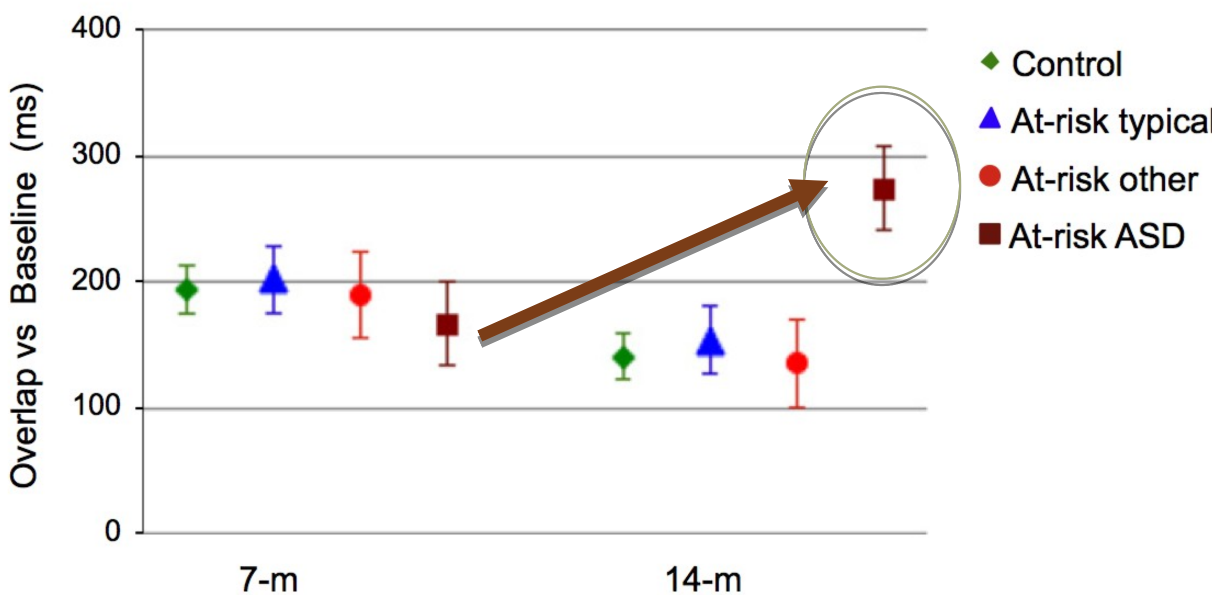


Abilità di disancoraggio



Elsabbagh et al. (2013), *Biol Psych*

Deficit dell'Attenzione nell'infanzia e futuro sviluppo di Autismo

ARCHIVAL REPORT

Disengagement of Visual Attention in Infancy Is Associated with Emerging Autism in Toddlerhood

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0006-3223/$36.00
http://dx.doi.org/10.1016/j.biopsych.2012.11.030
BIOL PSYCHIATRY 2013;■:■■■–■■■
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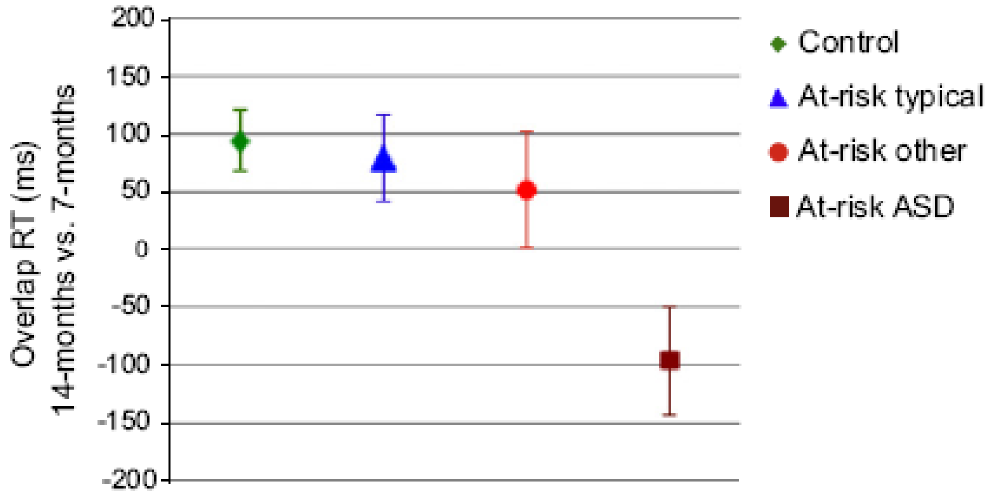
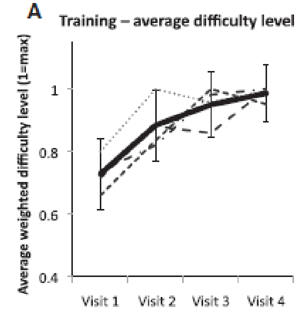


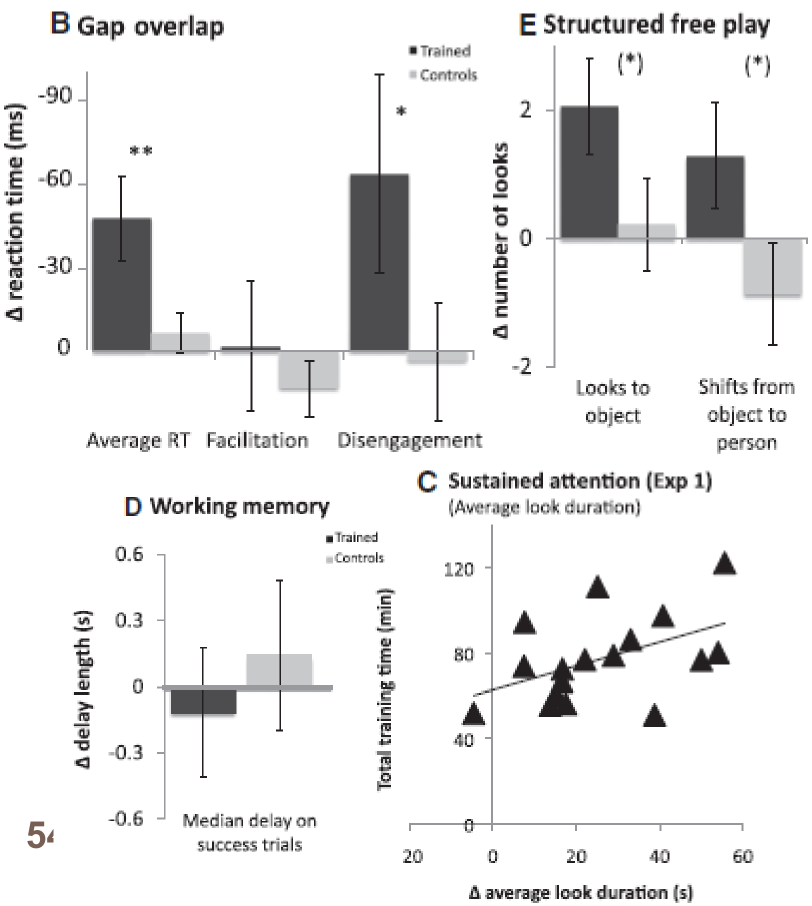
Current Biology 21, 1543–1547, September 27, 2011 ©2011 Elsevier Ltd. Open access under CC BY license. DOI 10.1016/j.cub.2011.08.004



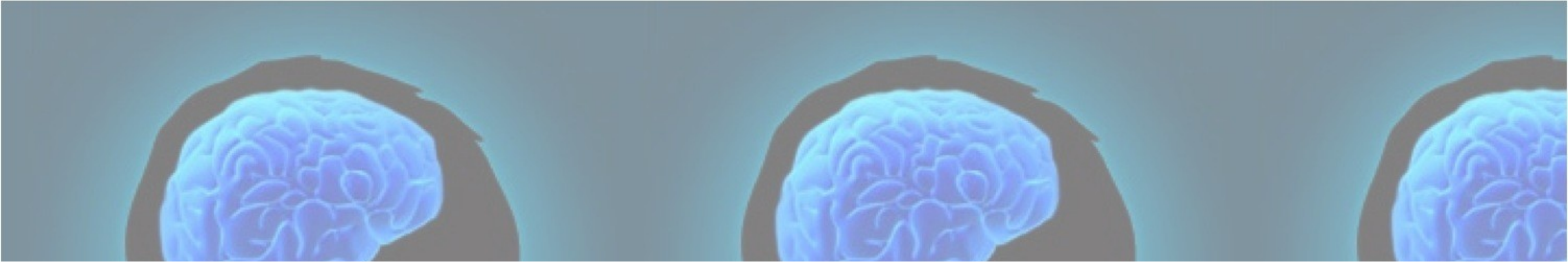
Report

Training Attentional Control in Infancy

Sam Wass,[1,2,*] Kaska Porayska-Pomsta,[2]
and Mark H. Johnson[1]
[1]Centre for Brain and Cognitive Development, Department of Psychological Sciences, Birkbeck, University of London, London WC1E 7HX, UK
[2]London Knowledge Lab, Institute of Education, London WC1N 3QS, UK



Several recent studies have reported that cognitive training in adults does not lead to generalized performance improvements [1, 2], whereas many studies with younger participants (children 4 years and older) have reported distal transfer [3, 4]. This is consistent with convergent evidence [5–8] for greater neural and behavioral plasticity earlier in development. We used gaze-contingent paradigms to train 11-month-old infants on a battery of attentional control tasks. Relative to an active control group, and following only a relatively short training period, posttraining assessments revealed improvements in cognitive control and sustained attention, reduced saccadic reaction times, and reduced latencies to disengage visual attention. Trend changes were also observed in spontaneous looking behavior during free play, but no change was found in working memory. The amount of training correlated with the degree of improvement on some measures. These findings are to our knowledge the first demonstration of distal transfer following attentional control training in infancy. Given the longitudinal relationships identified between early attentional control and learning in academic settings [9, 10], and the causal role that impaired control of attention may play in disrupting learning in several disorders [11–14], the current results open a number of avenues for future work.



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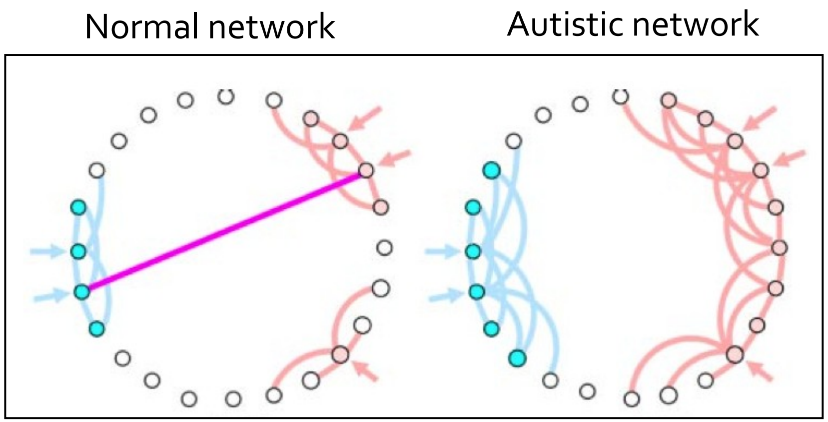
Possibili basi neurobiologiche del “local bias” percettivo da deficit di disancoraggio e zoom-out attenzionale?

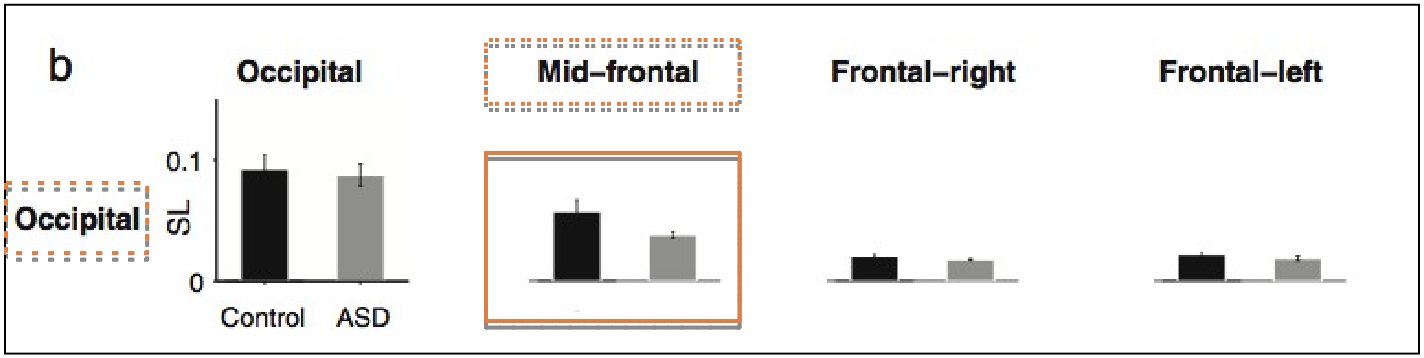
Deficit nello zoom-out: quali possibili basi neurali?

Belmonte et al. (2004): anormalità nella connettività a causa di difetti nel processo di "pruning" e differenziamento sinaptico.

- ✓ **Iper-**connettività a **breve raggio**
- ✓ **Ipo-**connettività a **lungo raggio**



•Connettività dinamica (EEG, frequenze Delta) mostra che la ipo-connettività più marcata è a livello frontale (medio) – occipitale (Bartffeld et al., 2010).



Cell Reports
Report

Local Functional Overconnectivity in Posterior Brain Regions Is Associated with Symptom Severity in Autism Spectrum Disorders

Christopher Lee Keown,[1,2] Patricia Shih,[3] Aarti Nair,[1,4] Nick Peterson,[1,5] Mark Edward Mulvey,[1,2] and Ralph-Axel Müller[1,4,*]
[1]Brain Development Imaging Laboratory, Department of Psychology, San Diego State University, San Diego, CA 92120, USA
[2]Computational Science Research Center, San Diego State University, San Diego, CA 92182, USA
[3]Neuroscience Department, Brown University, Providence, RI 02912, USA
[4]Joint Doctoral Program in Clinical Psychology, San Diego State University and University of California, San Diego, San Diego, CA 92182, USA
[5]Department of Mathematics and Statistics, San Diego State University, San Diego, CA 92182, USA

Although growing evidence indicates atypical long-distance connectivity in autism spectrum disorder (ASD), much less is known about local connectivity, despite conjectures that local overconnectivity may be causally involved in the disorder. Using functional connectivity MRI and graph theory, we found that local functional connectivity was atypically increased in adolescents with ASD in temporo-occipital regions bilaterally. Posterior overconnectivity was found to be associated with higher ASD symptom severity, whereas an ASD subsample with low severity showed frontal underconnectivity. The findings suggest links between symptomatology and local connectivity, which vary within the autism spectrum.

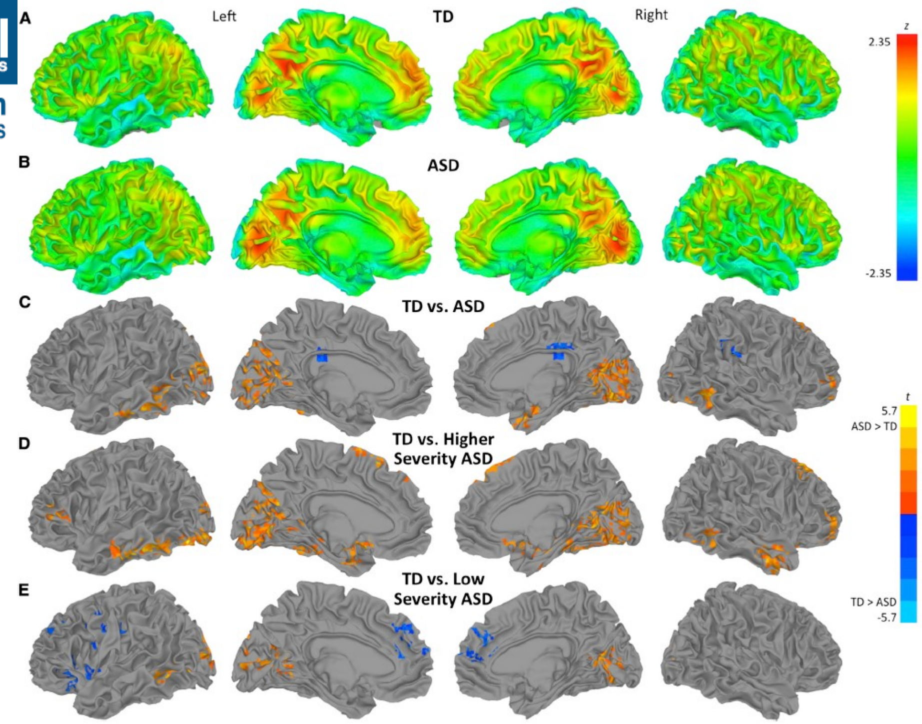
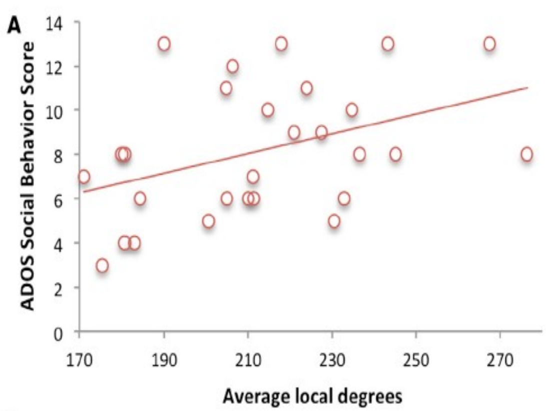


Figure 1. Within- and Between-Group Maps for Local Connection Density
(A–E) Surface renderings of local connectivity density for TD (A) and ASD groups (B). Greater *Z* scores correspond to brain regions with high connectivity (red scale). Clusters of significant group differences in local degrees ($p < 0.05$; corrected [corr.]) for entire ASD cohort (C) as well as for higher-severity (D) and low-severity (E) ASD subgroups in comparison to the TD group (warm colors: ASD > TD; cool colors TD > ASD).



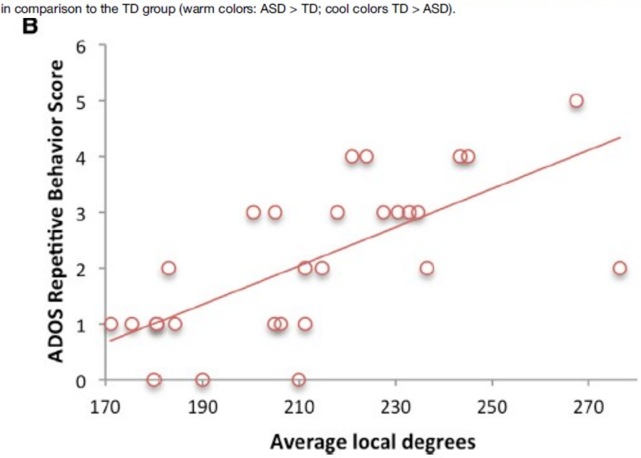


Figure 2. Correlations between Local Connection Density and Symptom Severity
(A and B) Correlations of average local degrees in clusters of significant group differences (all clusters in Figures 1D and 1E combined) with ADOS social (A) and repetitive behavior scores (B) in the ASD group.

J Autism Dev Disord
DOI 10.1007/s10803-014-2202-y

ORIGINAL PAPER

Autism Treatment in the First Year of Life: A Pilot Study of Infant Start, a Parent-Implemented Intervention for Symptomatic Infants

S. J. Rogers · L. Vismara · A. L. Wagner ·
C. McCormick · G. Young · S. Ozonoff

© Springer Science+Business Media New York 2014

Parent-mediated intervention versus no intervention for infants at high risk of autism: a parallel, single-blind, randomised trial

*Jonathan Green, Tony Charman, Andrew Pickles, Ming W Wan, Mayada Elsabbagh, Vicky Slonims, Carol Taylor, Janet McNally, Rhonda Booth, Teodora Gliga, Emily J H Jones, Clare Harrop, Rachael Bedford, Mark H Johnson, and the BASIS team**

Summary

Background Risk markers for later autism identified in the first year of life present plausible intervention targets during early development. We aimed to assess the effect of a parent-mediated intervention for infants at high risk of autism on these markers.

Lancet Psychiatry 2015; 2: 133–40

Published Online January 22, 2015

Interpretation With the exception of the response to vowel change, our study showed positive estimates across a wide range of behavioural and brain function risk-markers and developmental outcomes that are consistent with a moderate intervention effect to reduce the risk for later autism. However, the estimates have wide CIs that include possible nil or small negative effects. The results are encouraging for development and prevention science, but need larger-scale replication to improve precision.

andreafacoetti@unipd.it