IV Parte: 3 Dicembre 2015

SEDE DEL CORSO

CTS.centroDARI

PRESSE LA SCUOLA MEDIA STATALE “PACINOTTI”
via C. De Cristoforis, 2
VII Istituto Comprensivo – PADOVA

I MECCANISMI ATenzionali nei DSA:
Dalle Neuroscienze alla Scuola

3 Dicembre 2015
ore 16:30 – 19:30

STUDI RIABILITATIVI

- Alla ricerca delle cause dei DSA 2

Relatore: Andrea Facoetti
Assistant Professor - Department of General Psychology - University of Padova

SEGRETERIA (Progettazione, Organizzazione e Gestione)

Aurelio Micelli

CENTRO TERRITORIALE DI SUPPORTO PER LE TECNOLOGIE E LA DISABILITÀ

Referente CTS.centroDARI di Padova
Tel.: 049.8073100
Email: cts.padova@gmail.com
Navon task:
e.g., Local task
Local task

RT msec

Congruent  Incongruent

Normal readers

Poor readers
Dyslexia: a deficit in visuo-spatial attention, not in phonological processing

Trichur R. Vidyasagar¹ and Kristen Pammer²

¹ Department of Optometry & Vision Sciences, University of Melbourne, Parkville, Vic 3010, Australia
² Department of Psychology, The Australian National University, Canberra A.C.T., Australia
Perceptual learning as a possible new approach for remediation and prevention of developmental dyslexia

Simone Gori *, Andrea Facoetti *

Developmental and Cognitive Neuroscience Lab, Department of General Psychology, University of Padua, Padua 35131, Italy
Developmental Neuropsychology Unit, Scientific Institute "E. Medea", Rospilio Parni, Lecco 23842, Italy

Coherent dot motion task
Modelling relations between sensory processing, speech perception, orthographic and phonological ability, and literacy achievement

Bart Boets a,b,*, Jan Wouters b, Astrid van Wieringen b, Bert De Smedt a, Pol Ghesquière a

a Centre for Disability, Special Needs Education and Child Care, Faculty of Psychology and Educational Sciences, Katholieke Universiteit Leuven, Belgium
b Laboratory for Experimental ORL, Department of Neurosciences, Katholieke Universiteit Leuven, Belgium
Fig. 1. The original structural model tested in the path analysis.
Fig. 2. Path analysis predicting first grade reading and spelling achievement. $p < .05$, $** p < .01$ and $*** p < .001$. 
4. Attention Predicts dyslexia

**The second longitudinal study: N=105**

Predicting the 60% of text reading variance in first grade (T2) by using pre-reading (T1) phonological, attention and cross-modal integration.

- T1 = pre-reading stage
- T2 = first grade

- **Age and Verbal IQ**
- **Phonological Skills**
- **Visuo-spatial attention**
- **Cross-modal mapping**

60% of the Text reading efficiency (mean between speed and accuracy)
Un studio longitudinale dell’attenzione uditiva: Giudizio dell’ordine temporale

Auditory Temporal Order Judgment

<table>
<thead>
<tr>
<th>Task</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllabic Segmentation (errors)</td>
<td>NR 1.07</td>
<td>2.56</td>
<td>0.038*</td>
</tr>
<tr>
<td></td>
<td>PR 3.22</td>
<td>5.47</td>
<td></td>
</tr>
<tr>
<td>Syllabic Perception (errors)</td>
<td>NR 1.44</td>
<td>2.05</td>
<td>0.053</td>
</tr>
<tr>
<td></td>
<td>PR 2.78</td>
<td>2.86</td>
<td></td>
</tr>
</tbody>
</table>
Un studio longitudinale dell’attenzione uditiva: Giudizio dell’ordine temporale
Trattamento Bakker (riduttivamente “tachistoscopio”) e attenzione visuo-spaziale
The role of visuospatial attention in developmental dyslexia: evidence from a rehabilitation study

Andrea Facoetti, Maria Luisa Lorusso, Pierluigi Paganoni, Carlo Umiltà, Gian Gastone Mascetti

<table>
<thead>
<tr>
<th></th>
<th>VHSS training</th>
<th>Speech program</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>9.85</td>
<td>9.83</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td><strong>Full IQ</strong></td>
<td>104</td>
<td>105</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td><strong>Reading accuracy</strong></td>
<td>10.6</td>
<td>8.4</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>(errors on 200 syllables)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reading speed</strong></td>
<td>88.71</td>
<td>83.83</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>(time per syllable)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Attentional inhibition (ms)</strong></td>
<td>0</td>
<td>-6</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

**Reading Accuracy**

![Reading Accuracy Graph]

**Reading Speed**

![Reading Speed Graph]

**Reaction Time (ms)**

![Reaction Time Graph]
L’Approccio Riabilitativo: Tachistoscopio “Centrale” di 14 Dislessici (tratt. Insensivo: 6 sedute settimanali x 4 settimane)
Effetti del Trattamento Tachistoscopico
"Centrale" (N=14)
Pre Post
Fase del trattamento
IOR [ms] Facilitazione
Eff cue 100
Eff cue 250
Eff cue 400
Rapid Sequential Processing Training

Sandro Franceschini, Simone Gori, Luca Ronconi
Andrea Facoetti
Enhanced reading by training with imposed time constraint in typical and dyslexic adults

Zvia Breznitz¹, Shelley Shaul¹, Tzipi Horowitz-Kraus¹, Itamar Sela¹,², Michael Nevat¹ & Avi Karni¹,²

read faster. Here we show that this improvement can be enhanced by training. Training follows a multi-session procedure adapted to silent sentence reading, with individually set, increasingly more demanding, time constraints (letter-by-letter masking). In both typical and dyslexic adult readers, reading times are shortened and comprehension improves. After
constraints proves ineffective. Our results suggest that fluent reading depends in part on rapid information processing, which then might affect perception, cognitive processing and possibly eye movements. These processes remain malleable in adulthood, even in individuals with developmental dyslexia.
Partecipanti alla ricerca

13 Bambini (6 maschi, 7 femmine) frequentanti classi dalla 3° elementare, alla 3° media. Età media = 121,8, DS = 23
Tutti i bambini del campione erano di madre lingua italiana.

<table>
<thead>
<tr>
<th>Particolari attività</th>
<th>tempo Z score (DS)</th>
<th>errori Z score (DS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lettura Liste parole</td>
<td>-4,2 (5,3)</td>
<td>-3,9 (4,56)</td>
</tr>
<tr>
<td>Lettura Liste non parole</td>
<td>-2,35 (2,81)</td>
<td>-2,33 (2,37)</td>
</tr>
<tr>
<td>Brano MT</td>
<td>-1,99 (0,84)</td>
<td>-0,47 (1,35)</td>
</tr>
</tbody>
</table>

Struttura della ricerca

<table>
<thead>
<tr>
<th></th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1° Valutazione abilità:</td>
<td>10 giorni</td>
<td>10 gg</td>
<td>3° Valutazione</td>
</tr>
<tr>
<td></td>
<td>Lettura</td>
<td>2° Valutazione</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Associative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fonologiche</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attentive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Test utilizzati

**T1  T2  T3**

**Compiti Lettura**

- **Lettura di un testo**  MT
  (MT test, Cornoldi & Colpo, 1998)

- **Liste di Non Parole**  DDE
  (Sartori, Job e Tressoldi, 2007)

- **Liste di parole**  DDE
  (Carriero et al, 2001)

**Associazione suono-simbolo**

- **RAN di figure geometriche**

**Abilità fonologiche**

- **Ripetizione di non parole**  VAUMeLF
  (Bertelli e Bilancia, 2006)

**Abilità Visuo-attentive**

- **Attentional Masking**
Trattamento

10 giorni complessivi, circa 45 minuti al giorno, 3 blocchi da 30 frasi intervallate da un videogame.
Chi ripara la macchina?

Marco
Meccanico
Autista
Elettricista
Alice mescola gli ingredienti in una ciotola

denti in una ciotola

Dove mescola gli ingredienti Alice?

Ciotola

Pentola

Tazza

Dove mescola gli ingredienti Alice?

Ciotola

Pentola

Tazza
Risultati

**Tempo medio per lettera**

**Risposte corrette**
Risultati

Lettura ripetuta dello stesso brano:

Valutata la prestazione utilizzando l’indice di inefficienza (tempo/accuratezza) il trattamento (T3) migliora significativamente le prestazioni di lettura rispetto alla valutazione precedente (T2)

M=0,16 (DS=0,26) Incremento medio (T2-T3) in secondi per sillaba

* p=0,054
★ p<0,05
Somministrando due brani diversi, si osserva un significativo aumento della velocità di lettura, ed una accuratezza invariata.

**Velocità lettura**

<table>
<thead>
<tr>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Errori lettura**

<table>
<thead>
<tr>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t_{(12)}=-2.104 \ p=0.0285$

$t_{(12)}=-0.57 \ p=0.579$
Lettura liste non parole T1-T2-T3

Si ottiene un effetto significativo nella velocità di lettura, ed un effetto sugli errori dovuto alla ripetizione del test.

Il miglioramento fra T2 e T3 in termini di secondi per sillaba è pari a 0,16.
Attentional Masking

500 msec

125-165 msec

40 msec

30-60-90-500 msec

40 msec

500 msec

500 msec

Attentional Masking
Risultati prova Attentional Masking

I tempi necessari per identificare la lettera presentata, diminuiscono significativamente a seguito del trattamento.

\[F_{(2,24)}=4,352 \ p=0,024\]
Dopo il trattamento, nella prova fonologica di ripetizione di non parole, si ha un incremento significativo delle performance.

\[ F_{(2,24)} = 7.779 \quad p = 0.002 \]
Innovativa anotomia funzionale della lettura
Il modello modificato di Stanislas Dehaene
Come migliorare l’attenzione visiva (e non solo)???

letters to nature

**Action video game modifies visual selective attention**

C. Shawn Green & Daphne Bavelier

Department of Brain and Cognitive Sciences, University of Rochester, New York

The effects of action video game experience on the time course of inhibition of return and the efficiency of visual search

Current Biology 20, 1573–1579, September 14, 2010 ©2010 Elsevier Ltd All rights reserved DOI 10.1016/j.cub.2010.07.040

**Improved Probabilistic Inference as a General Learning Mechanism with Action Video Games**

Acta Psychologica

The effects of video game playing on attention, memory, and executive control

Walter R. Boot*, Arthur F. Kramer, Dan C. Schacter, Paul A. Jenkins

**Video game players show more precise multisensory temporal processing abilities**

Sarah E. Donohue, Marty G. Woldorff, and Stephen R. Mitroff

Duke University, Durham, North Carolina

**Effect of Action Video Games on the Spatial Distribution of Visuospatial Attention**

C. Shawn Green, Daphne Bavelier

**Increasing Speed of Processing With Action Video Games**

Matthew W.C. Dye, C. Shawn Green, and Daphne Bavelier

Department of Brain and Cognitive Sciences, University of Rochester

Neural bases of selective attention in action video game players
Games to do you good

Neuroscientists should help to develop compelling video games that boost brain function and improve well-being, say Daphne Bavelier and Richard J. Davidson.
**BRAIN GAME**

When searching for a particular object in a sea of shapes, people who played video games regularly showed less activation of the brain regions linked to attention, a sign that their brains were performing the task more efficiently.

- People who rarely played video games
- People who played at least 5 hours of action video games per week

Brain networks associated with attention
Playing Super Mario induces structural brain plasticity: gray matter changes resulting from training with a commercial video game

S Kühn¹, T Gleich², RC Lorenz²,³, U Lindenberger¹ and J Gallinat²

Video gaming is a highly pervasive activity, providing a multitude of complex cognitive and motor demands. Gaming can be seen as an intense training of several skills. Associated cerebral structural plasticity induced has not been investigated so far. Comparing a control with a video gaming training group that was trained for 2 months for at least 30 min per day with a platformer game, we found significant gray matter (GM) increase in right hippocampal formation (HC), right dorsolateral prefrontal cortex (DLPFC) and bilateral cerebellum in the training group. The HC increase correlated with changes from egocentric to allocentric navigation.

Figure 1. Screenshot from the platformer video game trained (Super Mario 64).
Changes in search rate but not in the dynamics of exogenous attention in action videogame players

Bjorn Hubert-Wallander · C. Shawn Green · Michael Sugarman · Daphne Bavelier

Fig. 1 An example of the search stimuli presented to subjects. The subjects’ task on each trial was to decide whether a letter “b” or “d” was present among a set of unique distractor letters. Exactly one target letter was present on each trial. The search array remained on the screen until the subject made a response via a keypress.

Fig. 2 Mean reaction time data from Experiment 1A, along with best-fit lines for each group. RTs increased linearly with the addition of distractor letters to the display across groups, but the VGP group appeared to suffer a smaller RT cost for each additional distractor than did the NVGP group. This manifests here as a shallower slope in the VGP best-fit line as compared to the NVGP line. Error bars represent standard errors. One NVGP subject is not included (see the Experiment 1B analysis).
Learning, Attentional Control, and Action Video Games

C.S. Green¹, * and D. Bavelier²,³,*

Figure 3. Training study design. Individuals who report playing little to no video games (both males and females) are recruited and pre-tested on measures of interest. The pre-test measures are specifically designed to minimize task-specific learning (for example, small numbers of trials, no feedback). Following pre-test, the groups are randomly assigned to play either an action game or a non-action, control game. The games are matched as closely as possible for as many aspects of game play as possible (identification with character, fun, ‘flow’, and so on) while leaving attentional and action demands different. Subjects come to the lab to play the game one to two hours a day (maximum of 10 hours a week) for anywhere from 10 to 50 hours depending on the study. Once the training is completed (and at least 24 hours after the last training session ends to ensure that any observed effects are not due to transient changes in physiology/arousal), subjects complete similar tasks as during pre-test. A causal role of action game playing is indicated by a larger change from pre- to post-test in the action trained group than in the non-action trained group.
Action-Video-Game Experience Alters the Spatial Resolution of Vision

C.S. Green and D. Baveller
Department of Brain and Cognitive Sciences, University of Rochester

Fig. 1. Illustration of the test stimuli. The stimuli consisted of three T-shapes randomly oriented either right side up or upside down. The subject’s task was to indicate the orientation of the center T. In separate blocks, three eccentricities were tested—0°, 10°, and 25°. The size of the Ts was set to be 1.5 times each individual subject’s T-alone threshold at each eccentricity.

Crowding thresholds in Experiments 1 and 2. In Experiment 1 (a), thresholds of action-video-game players (VGPs) and non-action-video-game players (NVGPs) were compared. In Experiment 2, NVGPs were trained on an action video game (b) or a control game (c), and their crowding thresholds were measured before (“Pre”) and after (“Post”) training. Standard errors of the means for all data points were less than the size of the squares denoting the values. Significant differences between thresholds at the same eccentricity are indicated by asterisks.
Improved Probabilistic Inference as a General Learning Mechanism with Action Video Games

C. Shawn Green, Alexandre Pouget, and Daphne Bavelier

Department of Brain and Cognitive Sciences, University of Rochester, Rochester, NY 14627, USA

meet our standards for improved probabilistic inference. These can be defined rigorously in the task we chose by considering decision making from a probabilistic perspective. Before committing to a choice, the best a subject can do is to

---

**A**

50% Motion Coherence

25% Motion Coherence

0% Motion Coherence

**B**

- NVGP (N=12)
- VGP (N=11)
- NVGP Model Fit
- VGP Model Fit

**C**

- Integration Rate
- Decision Bound
- Non-decision time
“Action Video-game” and Reading Treatment in Dyslexia???

letters to nature

Action video game modifies visual selective attention

C. Shawn Green & Daphne Bavelier

Department of Brain and Cognitive Sciences, Center for Visual Science, University of Rochester, Rochester, New York 14627, USA

Qui le caccia al coniglio, il nostro ;o)

http://www.youtube.com/watch?v=QVHVfiZ34xM

oppure

http://www.youtube.com/watch?v=G0WChifZS4U&feature=related

un gioco di controllo sempre coniglio

http://www.youtube.com/watch?v=HoSvCdBwJUj&feature=related
Non-gamer dyslexic children (N=20)

Pre-training (T1)

Non-action video games (N=10)

Action video games (N=10)

12 hours (80 minutes x 9 days)

Post-training (T2)

Follow-up (T3) after 2 months from T2
(ii) “Action Video-game” and Reading Treatment in Dyslexia???

letters to nature

Action video game modifies visual selective attention

C. Shawn Green & Daphne Bavelier

Department of Brain and Cognitive Sciences, Center for Visual Science, University of Rochester, Rochester, New York 14627, USA

<table>
<thead>
<tr>
<th></th>
<th>NAVGp</th>
<th>AVGp</th>
<th>t(18) p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (months)</td>
<td>114,72(±17,15)</td>
<td>121,43(±17,35)</td>
<td>.40</td>
</tr>
<tr>
<td>IQ</td>
<td>98,4(±9.94)</td>
<td>100,6(±10,23)</td>
<td>.63</td>
</tr>
<tr>
<td>Words reading</td>
<td>-2,87(±1,46)</td>
<td>-3,3(±2,85)</td>
<td>.67</td>
</tr>
<tr>
<td>Pseudo-words reading</td>
<td>-2,48(±1,51)</td>
<td>-2,05(±1,31)</td>
<td>.50</td>
</tr>
<tr>
<td>Phonemic blending (number of correct phonemes)</td>
<td>30,9(±16,1)</td>
<td>32,6(±15,52)</td>
<td>.80</td>
</tr>
</tbody>
</table>
Miglioramento spontaneo atteso in un anno in un dislessico nelle non-parole=0,15 sill/sec

Miglioramento spontaneo atteso in un anno per un dislessico in un brano=0,30 sill/sec