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UNIVERSITÉ DE VERSAILLES ST-QUENTIN-EN-YVELINES

EBM et rééducation cognitive

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Différentes approches en rééducation cognitive

- Approche restaurative
  - Entraînement intensif, taches répétitives hiérarchisées (en débutant par les plus simples)
  - Les facteurs clés sont l'intensité et la durée de l'entraînement
- Compensation: apprentissage de strategies adaptatives
- Aides externes
  - outils numériques, environnement enrichi…

Difficultés méthodologiques des essais non médicamenteux

- Risque de biais positif
  - Absence de double aveugle
  - Effet placebo marqué
  - Effets non spécifiques (stimulation cognitive)
  - Effet re-test
  - Validité écologique des évaluations
- Risque de bias négatif
  - Échantillons de petite taille
  - Traitement de durée insuffisante

Quel groupe contrôle ?

- Sans traitement ?
  - Biais très fort (effet placebo, stimulation non spécifique)
- Traitement non spécifique, ne mettant pas en jeu la function traitée
  - Même intensité, même durée
  - Difficile à maitriser

Intensité / durée de la rééducation?

Questions :

- Relation effet/dose?
- Intensité minimale ?
- Traitement court et intensif vs long mais peu intensif ?
- Faisabilité dans un environnement clinique ?

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Groupe ou cas unique ?

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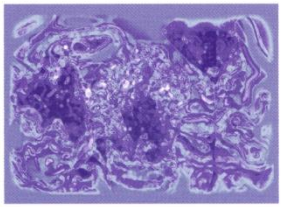
Single-case experimental design, SCED

- Rééducation individualisée
- Mesures de ligne de base répétées pour contrôler la stabilité pré-intervention
- Ligne de base multiple selon les fonctions
  - Comparaison de mesures cibles vs non cibles
- Ligne de base multiple selon les sujets
  - Variation aléatoire de la durée de la ligne de base
- Limites:
  - Effet placebo fort
  - Analyses statistiques complexes
  - Généralisabilité ?
  - Biais de publication

VOLUME 24 • ISSUE 3–4 •
JUNE–AUGUST 2014



Neuropsychological Rehabilitation

Special Issue: Single-case Experimental Design Methodology

Guest Editors: Rumen Manolov, Jonathan Evans, David Gast, and Michael Perdices

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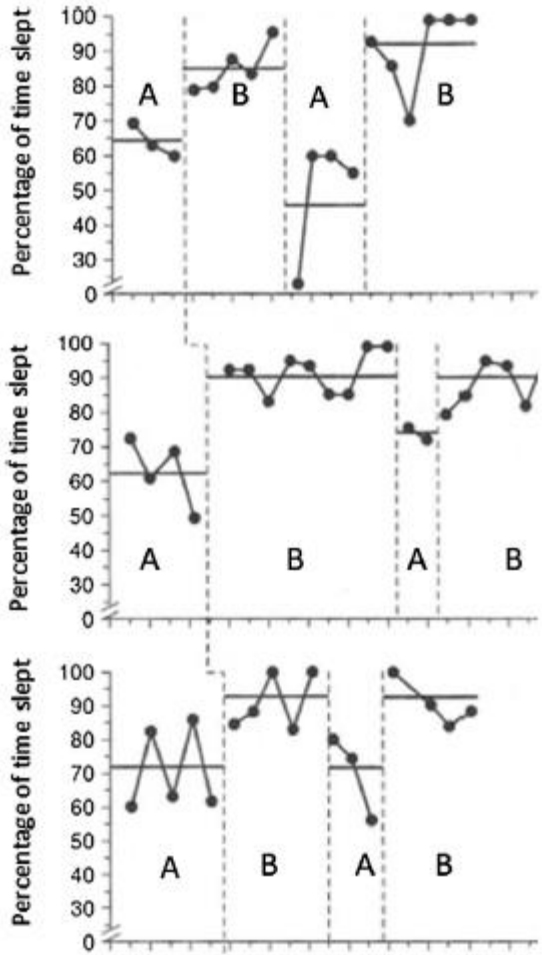
Exemples de SCED (Manolov et al., 2014)



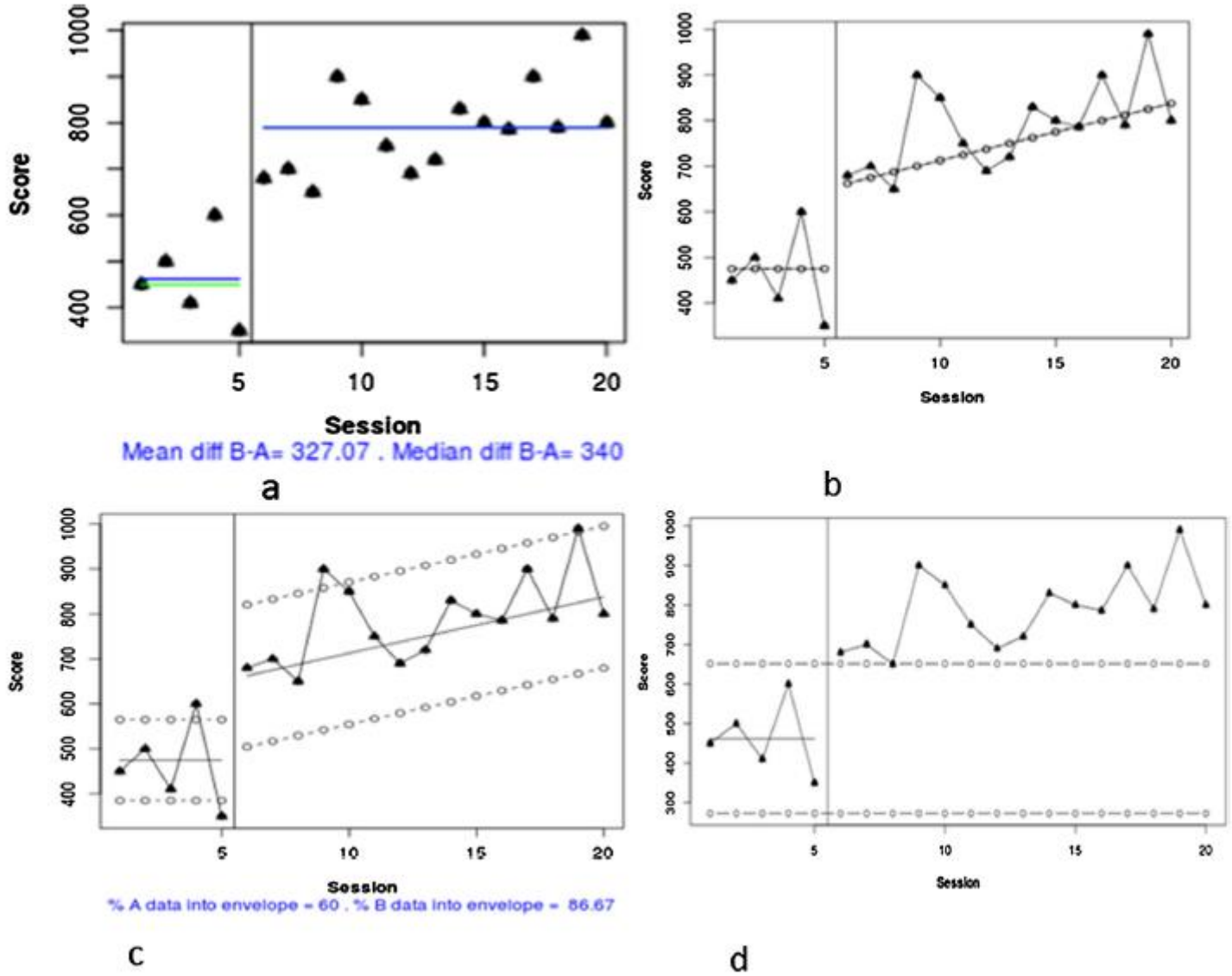


Fig. 6. Visual aids computed on a free single-case experimental designs (SCED)-analysis website: https://manolov.shinyapps.io/overlap. a: level; b: trend line; c: trend line stability envelope; d: two-standard deviation band.

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Modularité, généralisation, transfert

Exemples à partir d'études de rééducation de la mémoire de travail

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Brain Injury, December 2005; 19(13): 1157–1164

Taylor & Francis
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CASE STUDY

Rehabilitation of verbal working memory after left hemisphere stroke

C. VALLAT[1], P. AZOUVI[2], H. HARDISSON[3], R. MEFFERT[3],
C. TESSIER[3], & P. PRADAT-DIEHL[3]

Brain Injury, June 2009; 23(6): 585–594

informa
healthcare

CASE STUDY

Rehabilitation of the central executive of working memory after severe traumatic brain injury: Two single-case studies

CLAIRE VALLAT-AZOUVI[1,2,3], PASCALE PRADAT-DIEHL[2,3,4],
& PHILIPPE AZOUVI[2,3,5,6]

Neuropsychological Rehabilitation, 2014
http://dx.doi.org/10.1080/09602011.2014.881294

Routledge
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Modularity in rehabilitation of working memory: A single-case study

Claire Vallat-Azouvi[1,2], Pascale Pradat-Diehl[2,3], and Philippe Azouvi[2,4,5]

Neuropsychological Rehabilitation, 2014
http://dx.doi.org/10.1080/09602011.2014.881294

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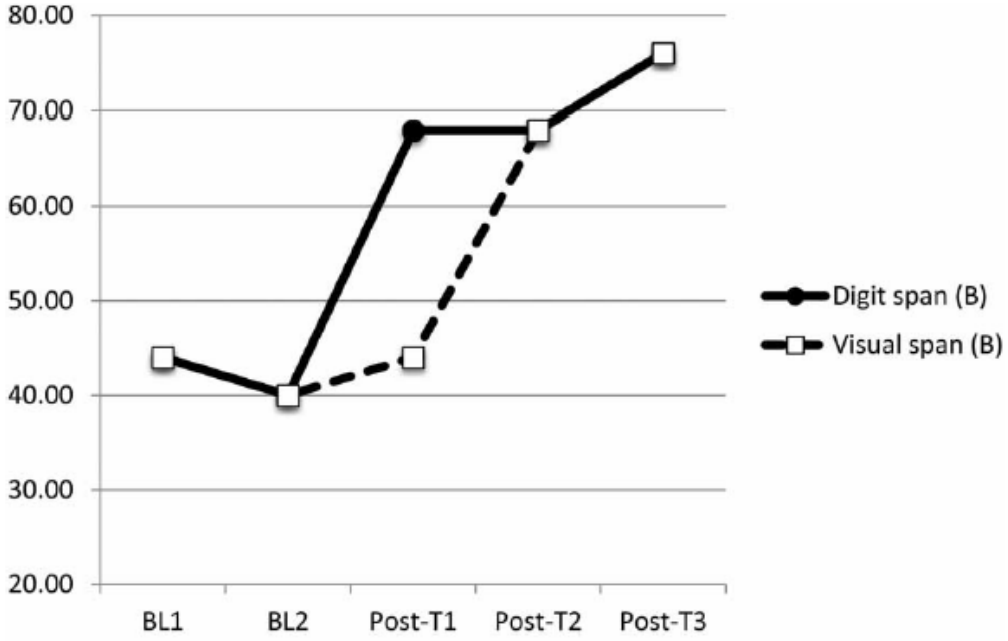
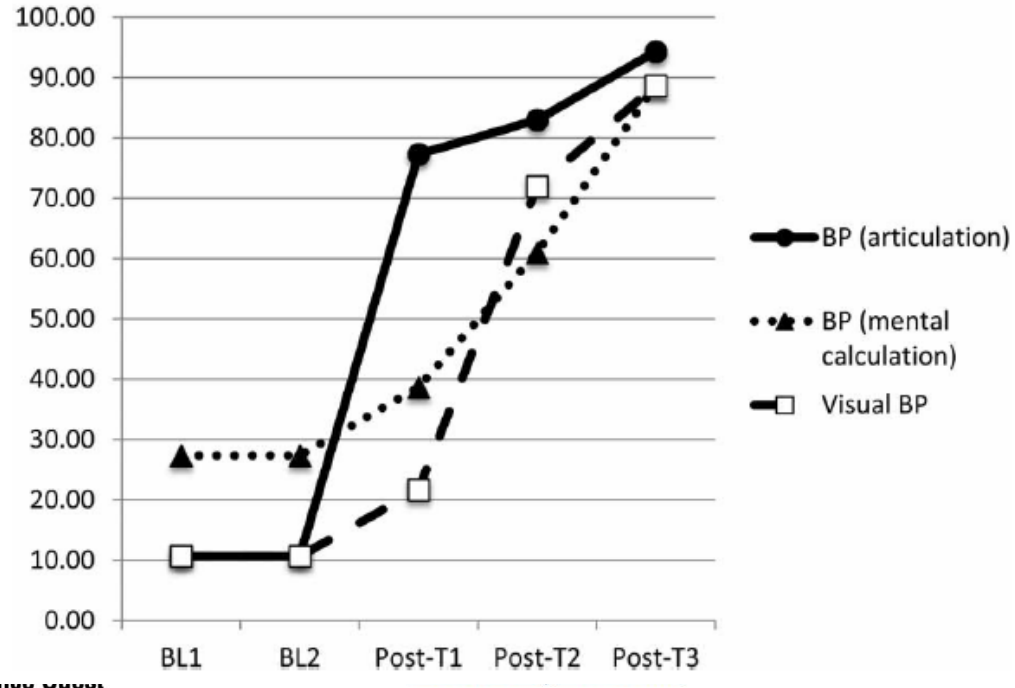
Modularity in rehabilitation of working memory: A single-case study

Claire Vallat-Azouvi[1,2], Pascale Pradat-Diehl[2,3], and Philippe Azouvi[2,4,5]

Trois périodes de rééducation successives:

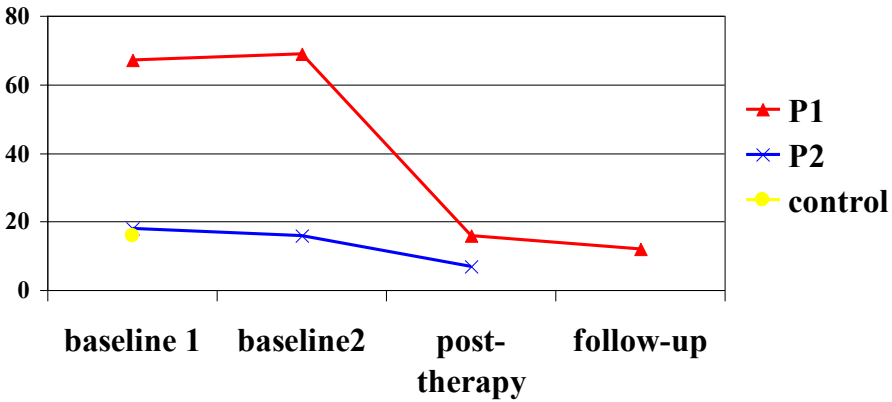
- MdT verbale
- MdT visuo-spatiale
- Aspects exécutifs de la mémoire de travail


80.00
70.00
60.00
50.00
40.00
30.00
20.00
BL1
BL2
Post-T1
Post-T2
Post-T3
Digit span (B)
Visual span (B)

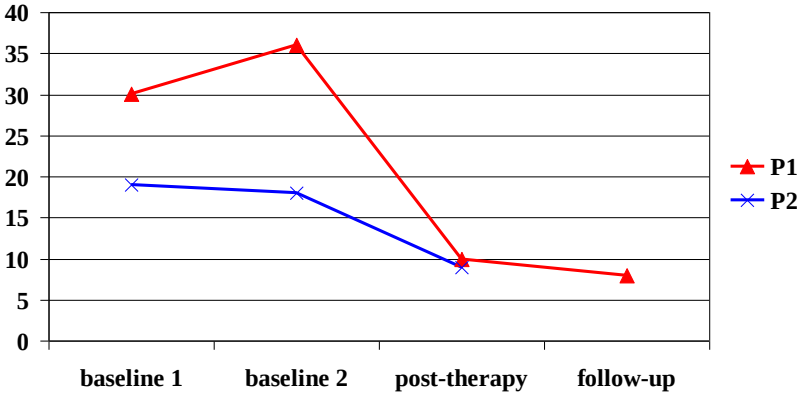

100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
BL1
BL2
Post-T1
Post-T2
Post-T3
BP (articulation)
BP (mental calculation)
Visual BP

Rehabilitation of working memory after severe TBI
(Vallat et al., 2005; 2007; Vallat-Azouvi et al., 2009)

- Generalization to daily life activities



Working Memory Questionnaire (Vallat et al., 2005)



Rating Scale of Attentional Behaviour (Ponsford & Kinsella, 1991)

Rééducation de l'attention divisée

Couillet et al., Neuropsychological Rehabilitation, 2010, 20:321-339

- Generalisation entre domaines attentionnels ?
- Taille d'effet moyen:
  - Divided attention subtest (TAP) : 1.84*
  - Divided attention – questionnaires (RSAB):1.48*
  - Working memory (Brown-Peterson): 0.82
  - Executive functions : 0.79*
  - Speed of information processing : 0.64
  - Selective attention : -0.08

Working Memory Training Does Not Improve Performance on Measures of Intelligence or Other Measures of "Far Transfer": Evidence From a Meta-Analytic Review

Perspectives on Psychological Science
2016, Vol. 11(4) 512–534
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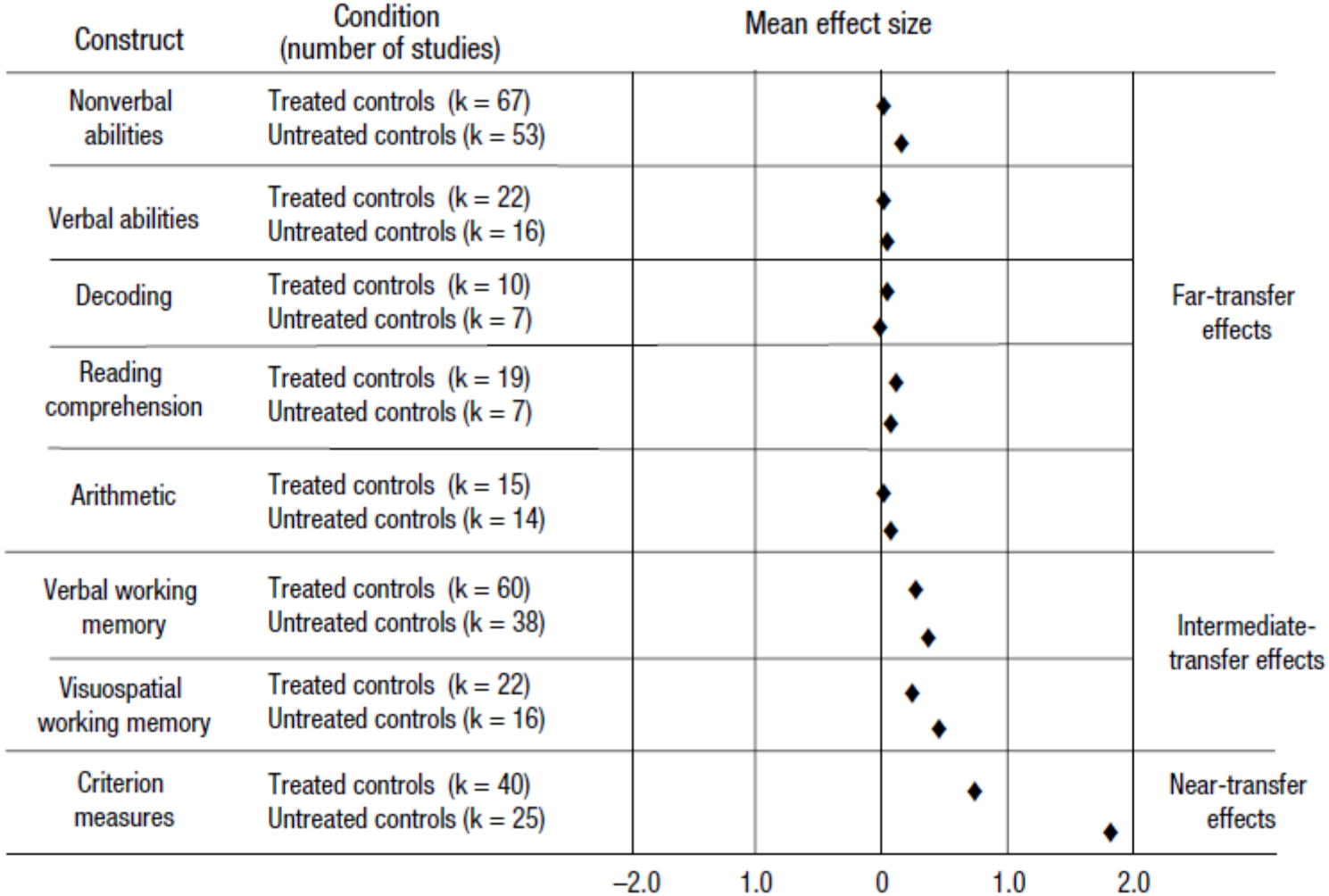

Fig. 2. Mean effects (g) on the transfer measures for studies with treated and untreated controls (k = number of studies)

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Can Impaired Working Memory Functioning Be Improved By Training? A Meta-Analysis With a Special Focus on Brain Injured Patients

Juliane Weicker
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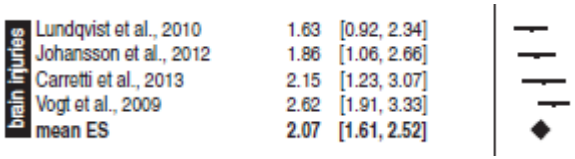
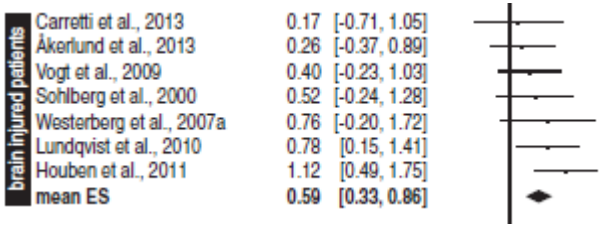
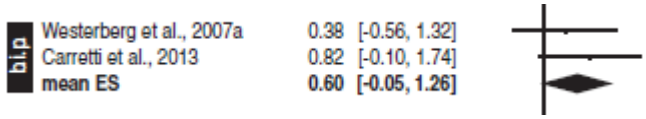
- Trained WM tasks



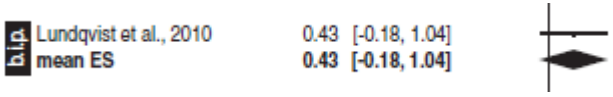
- Untrained WM tasks



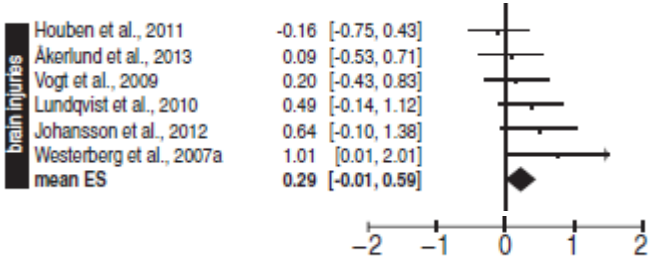
- Reasonning and intelligence



- Cognitive control- executive functions



- Daily life functioning



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- Pas d'effet significatif sur l'attention, la vitesse de traitement de l'information ou la mémoire à long terme
- Effet modérateur du nombre de sessions de rééducation (mais pas du nombre d'heures)
  - Taille de l'effet selon le nombre de sessions:
    - Études >20 sessions: g= 0.47 (0.38; 0.55)
    - Études <20 sessions: g=0.29 (0.2; 0.38); p <.01
  - Correlation enter le nombre de sessions et l'effet à long terme sur la MdT : r=0.50, p< .01
  - Le nombre de sessions explique plus de 25% de la variance de la performance en MdT

Kennedy et al. (2008): méta-analyse de la rééducation des fonctions exécutives (résolution de problèmes)

- 15 essais ≤ 2004
- 5 de niveau I
- Pas d'effet significatif sur les mesures de déficiences, par comparaison aux contrôles
- Effet significatif sur les mesures d'activité / participation
  - Effect-size (ES) groupe expérimental : 0.57 +/-0.002
  - ES groupe contrôle: 0.38 +/- 0.004
  - La différence est significative

Evidence-Based Cognitive Rehabilitation: Systematic Review of the Literature From 2009 Through 2014

Check for updates

Keith D. Cicerone, PhD,[a,b] Yelena Goldin, PhD,[a,b] Keith Ganci, PhD,[c]
Amy Rosenbaum, PhD,[d] Jennifer V. Wethe, PhD,[e] Donna M. Langenbahn, PhD,[f,g]
James F. Malec, PhD,[e,h] Thomas F. Bergquist, PhD,[e] Kristine Kingsley, PsyD,[f,g]
Drew Nagele, PsyD,[i,j] Lance Trexler, PhD,[h,k] Michael Fraas, PhD,[l]
Yelena Bogdanova, PhD,[m,n] J. Preston Harley, PhD[o]

Archives of Physical Medicine and Rehabilitation 2019;100:1515-33

Cicerone et al. (2000;2005; 2011; 2019): evidence-based cognitive rehabilitation

	Attention	Executive functions	Memory
< 1998	13/3	14/1	42/4
1998-2002	5/1	9/2	13/3
2003-2008	8/2	19/3	15/3
2009-2014	13/5	37/15	20/7
	39/11	69/21	90/17

N of published trials/ class I trials

Rohling et al. (2008) méta-analyse des premières revues de Cicerone et al. (2000; 2005)

- Fonctions exécutives: 14 essais
- Les groups contrôles s'améliorent!
  - Effect-size: 0.39
- Différence moyenne entre le gropue experimental et le groupe contrôle : ES=0.27 (95% CI: 0.04-0.50)
- Mais seules 9 études ont étudié le maintien des effets après l'arrêt du traitement

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Merci pour votre attention

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Trained WM intervention task ES=1.80 (1.58;2.01)

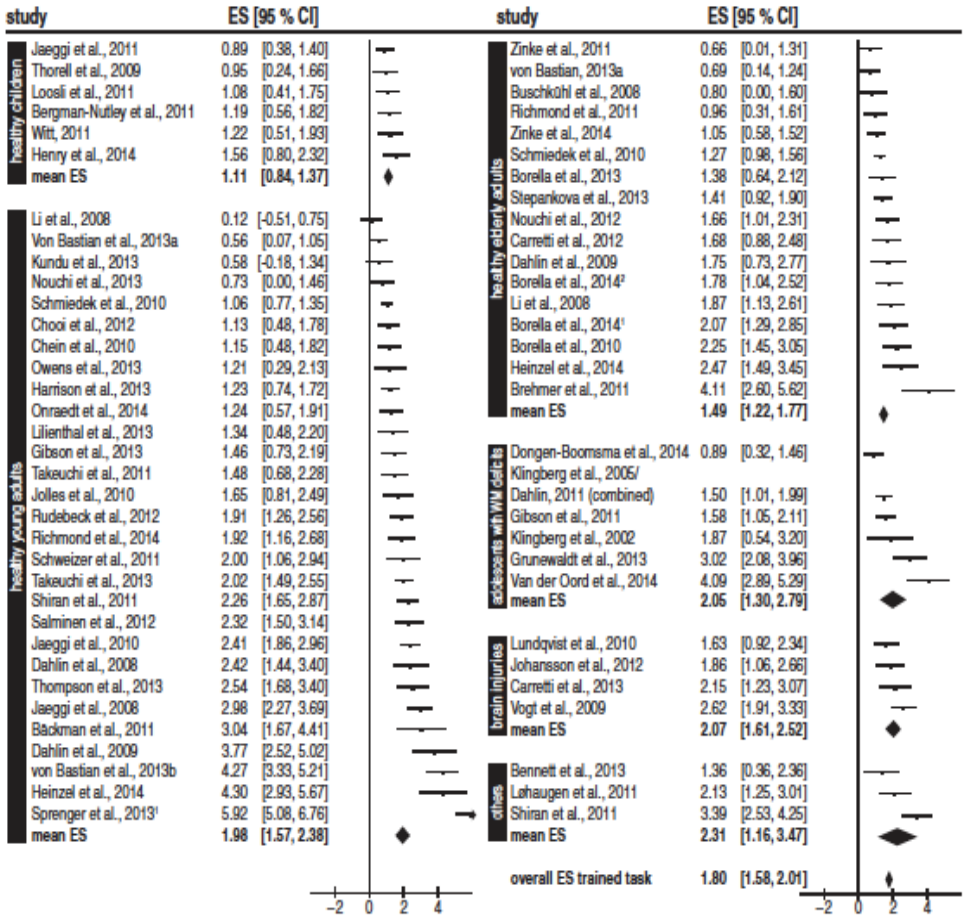

Figure 2. Forest plot for the improvement in the trained working memory (WM) intervention task. For each study, individual effect sizes (ES) and 95% confidence intervals (CIs) are depicted as rectangles and horizontal lines (the arrow indicates a CI exceeding 6). Mean effect sizes are illustrated by diamonds (width represents 95% CIs). All effect sizes represent Hedges' adjusted *g*. In studies with multiple independent group comparisons, first and second trials are labeled as [1] and [2], respectively.

Near-transfer effect on WM ES= 0.44 (0.35; 0.53)

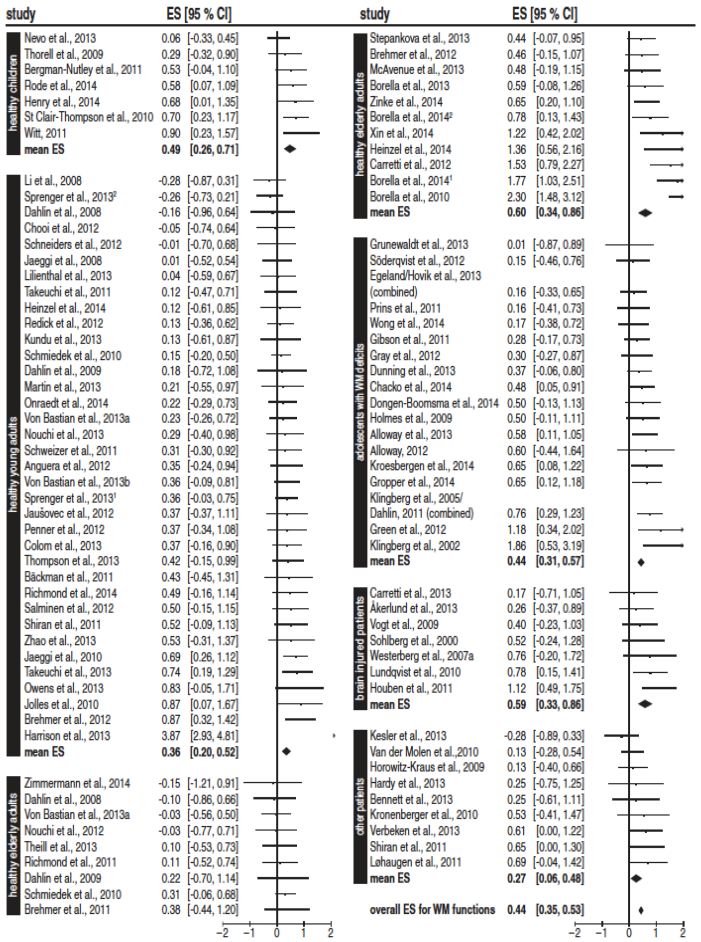

Figure 3. Forest plot for immediate near transfer effects on working memory (WM) functions. For each study, individual effect sizes (ES) and 95% confidence intervals (CIs) are depicted as rectangles and horizontal lines (arrows indicate CIs exceeding 2). Mean effect sizes are illustrated by diamonds (width represents 95% CIs). All effect sizes represent Hedges' adjusted g. In studies with multiple independent group comparisons, first and second trials are labeled as [1] and [2], respectively.

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Far-transfer effects on reasoning/intelligence (left, ES=0.24 (0.15-0.34)) and cognitive control (right, ES= 0.20 (0.10; 0.29)

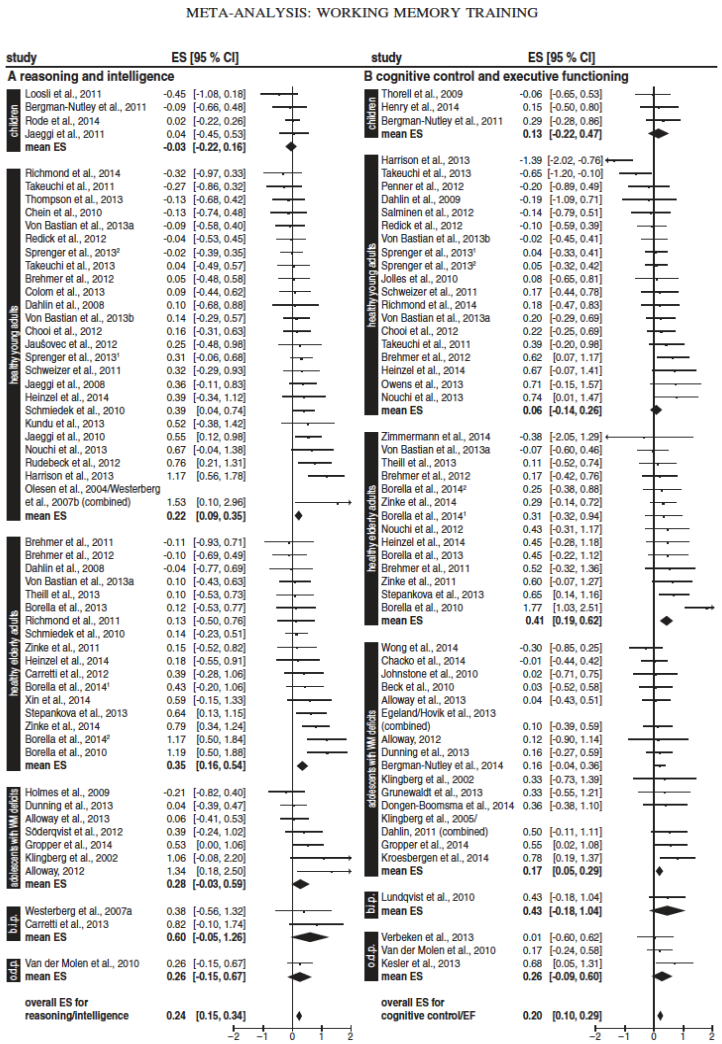

Figure 4. Forest plot for immediate far transfer effects on A reasoning/intelligence and B cognitive control/executive functioning. For each study, individual effect sizes (ES) and 95% confidence intervals (CI) are depicted as rectangles and horizontal lines (arrows indicate CIs exceeding 2). Mean effect sizes are illustrated by diamonds (width represents 95% CIs). All effect sizes represent Hedges' adjusted *g*. In studies with multiple independent group comparisons, first and second trials are labeled as [1] and [2], respectively. Subgroup abbreviations: b.i.p. = brain injured patients; children = healthy children; o.d.p. = otherwise diagnosed patients.

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Far-transfer effects for attention, memory and everyday life functioning (0.17-0.20)

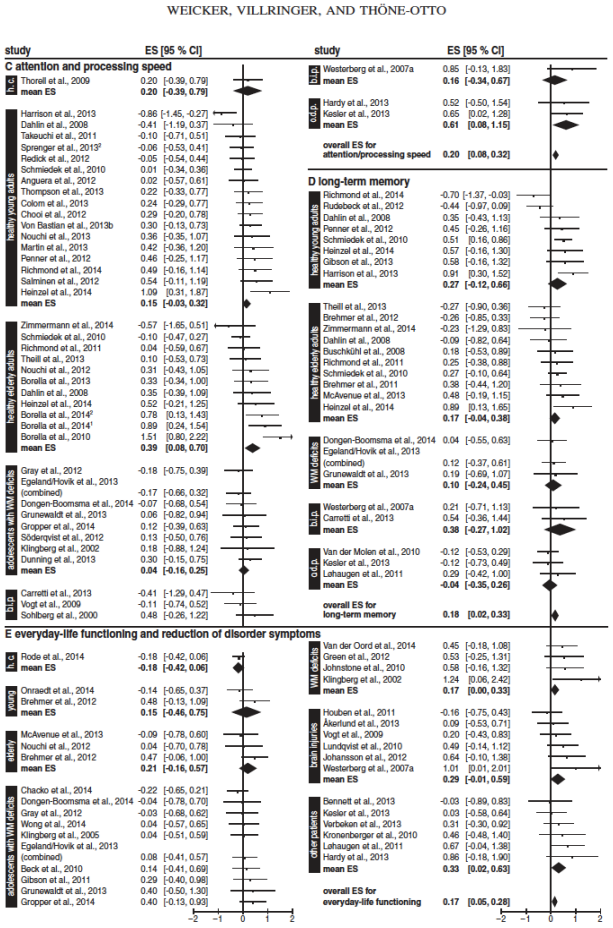

Figure 5. Forest plot for immediate far transfer effects on C attention/processing speed, D long-term memory and E everyday life functioning and reduction of disorder symptoms. For each study, individual effect sizes (ES) and 95% confidence intervals (CI) are depicted as rectangles and horizontal lines (arrows indicate CIs exceeding 2). Mean effect sizes are illustrated by diamonds (width represents 95% CIs). All effect sizes represent Hedges' adjusted *g*. In studies with multiple independent group comparisons, first and second trials are labeled as [1] and [2], respectively. Subgroup abbreviations: b.i.p./brain injuries = brain injured patients; elderly = healthy elderly adults; h.c. = healthy children; o.d.p. = otherwise diagnosed patients; WM deficits = children and adolescents with working memory deficits; young = healthy young adults.

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