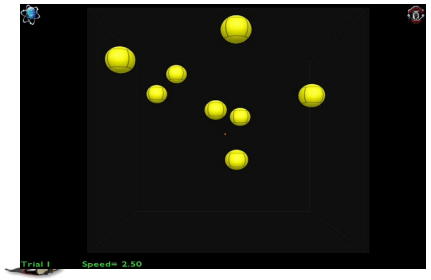
Évaluer l'efficacité de nouvelles technologies de mesures et d'entrainement perceptivo-cognitif afin de prédire et de réduire la probabilité de collision de la route en conduite automobile chez les aînés



Jocelyn Faubert1, Don Watanabe1
Francois Bellavance2

1Lab de Psychophysique et de Perception Visuelle,
École d'Optométrie, Université de Montréal
2Réseau de Recherche Sécurité Routière, HEC Montréal,

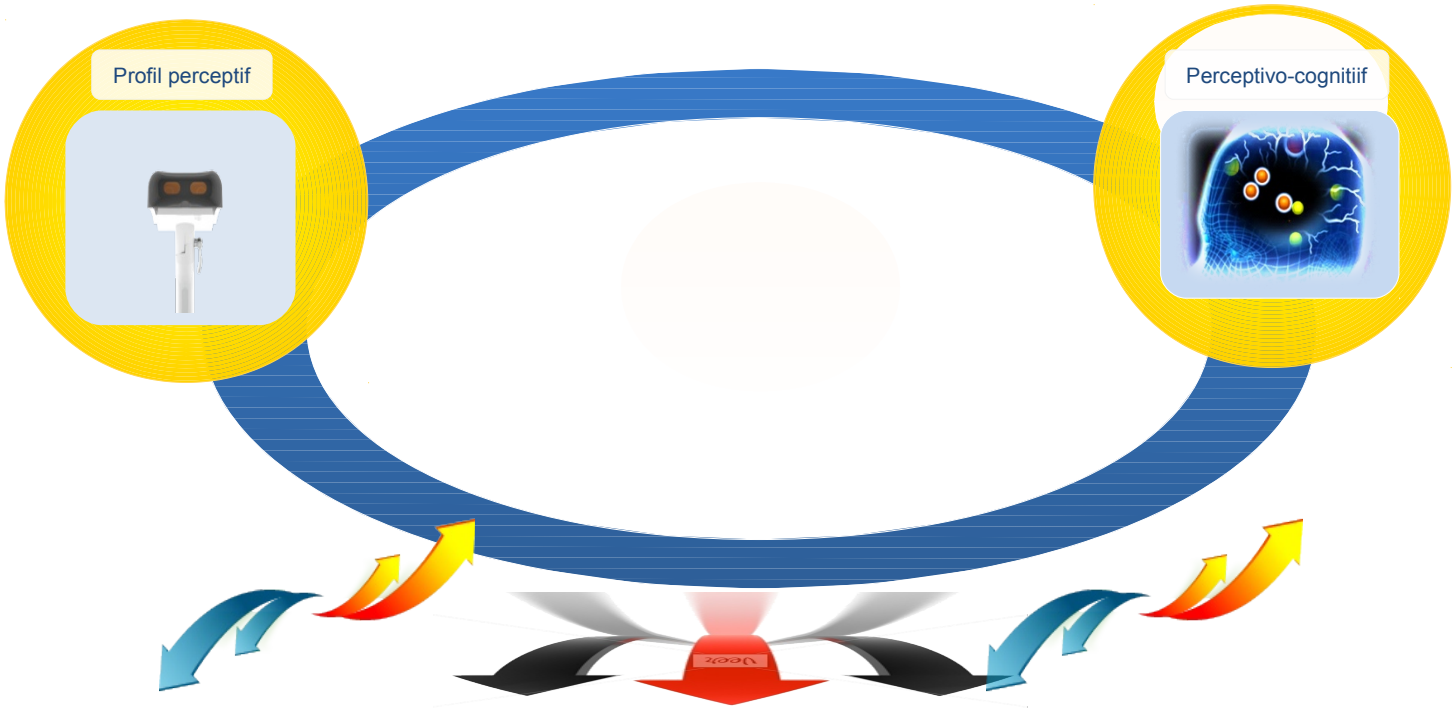
Étude FRQSC-SAAQ (pilote)

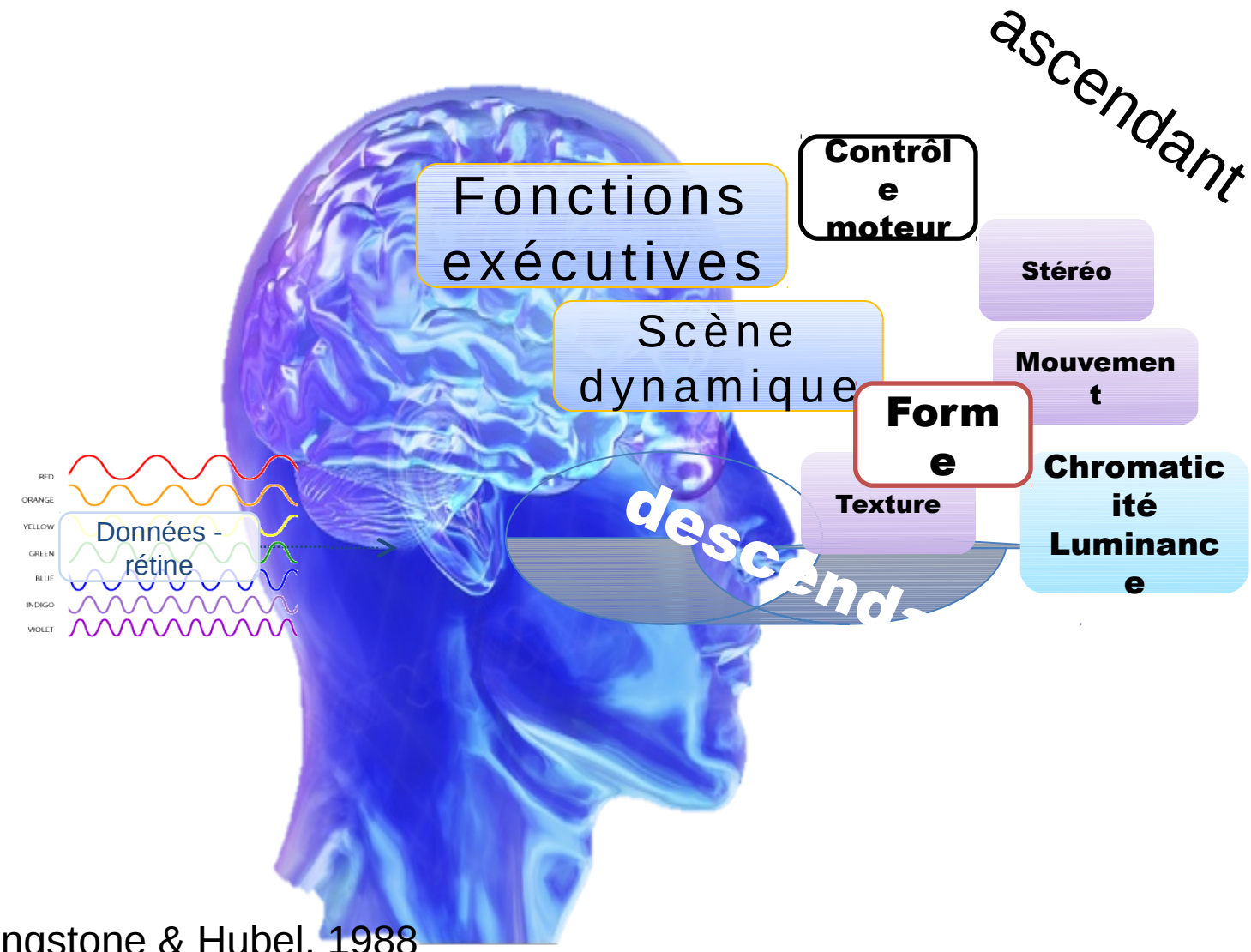
Lien entre fonctions perceptivo-cognitives et conduite automobile chez les ainés?
Intervention perceptivo-cognitive = amélioration de la conduite?

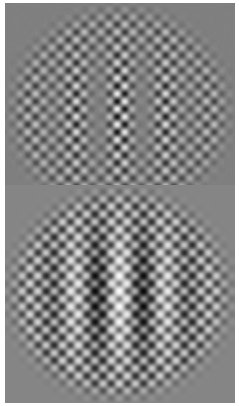
La presentation

- Expliquer le contexte théorique des mesures proposés
- Présenté quelques résultats préliminaires
- Futur

Produits





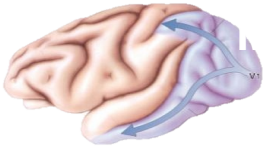


Attributs **(Complexe)**

Énergie **(Simple)**

Voies physiologiques

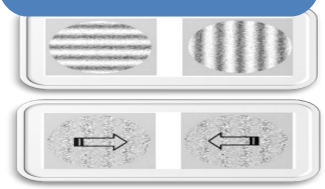
Dorsale

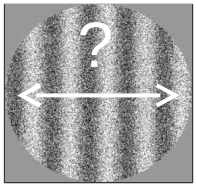


Ventrale

Livingstone & Hubel, 1988
Cavanagh, 1988
Goodale & Milner, 1992

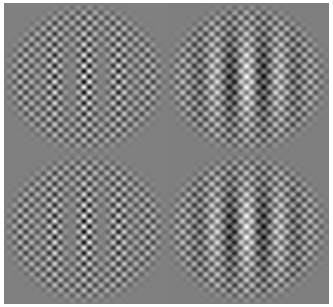
Orientation (statique)



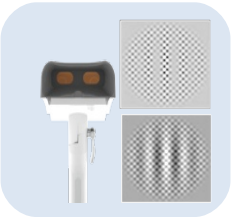


Direction (mouvement)

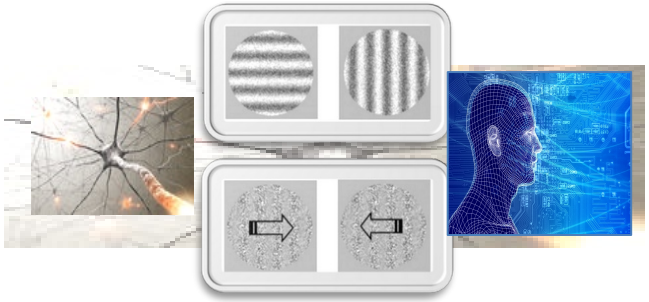
Energie Vs. Attribut

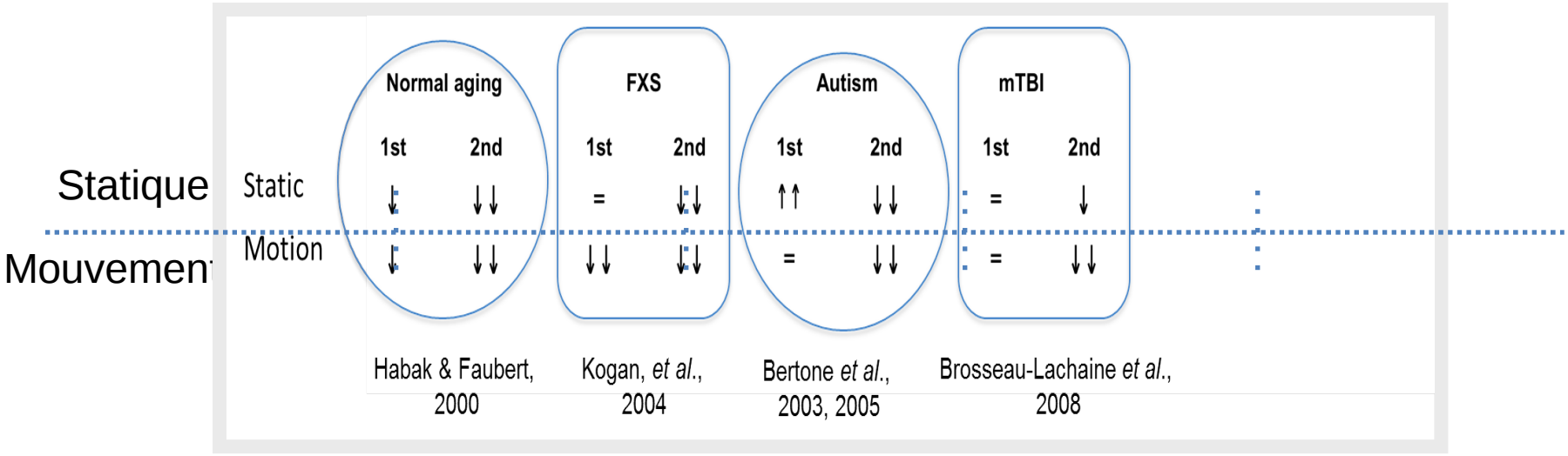


Résponse simple
Très rapide, portable
….



Profil Perceptif





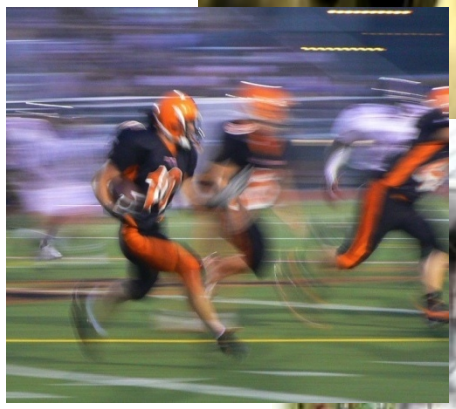
Flèches = sensibilité

Sensible aux altérations neurobiologiques

Mouvement de

Scène visuelle dynamique Hanoi

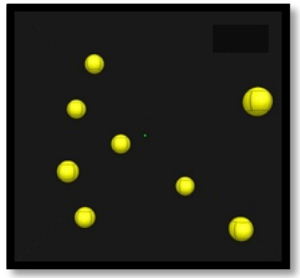
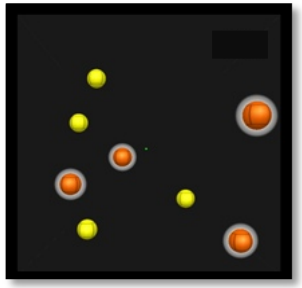
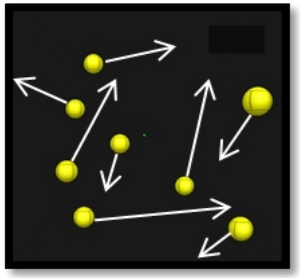
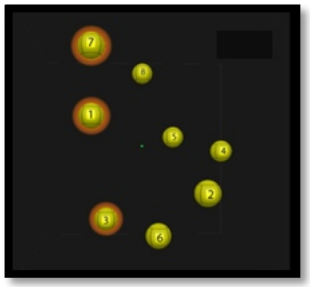
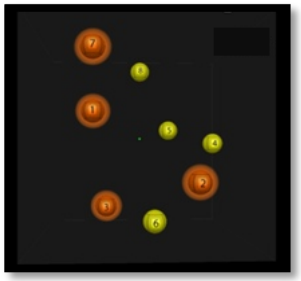
youtube

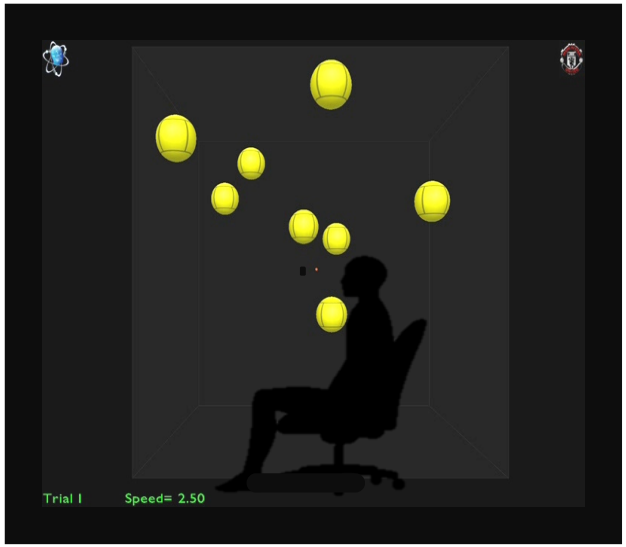


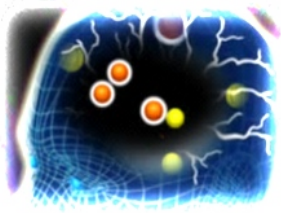
Poursuite à grande vitesse - critique

Faubert & Sidebottom (2012)

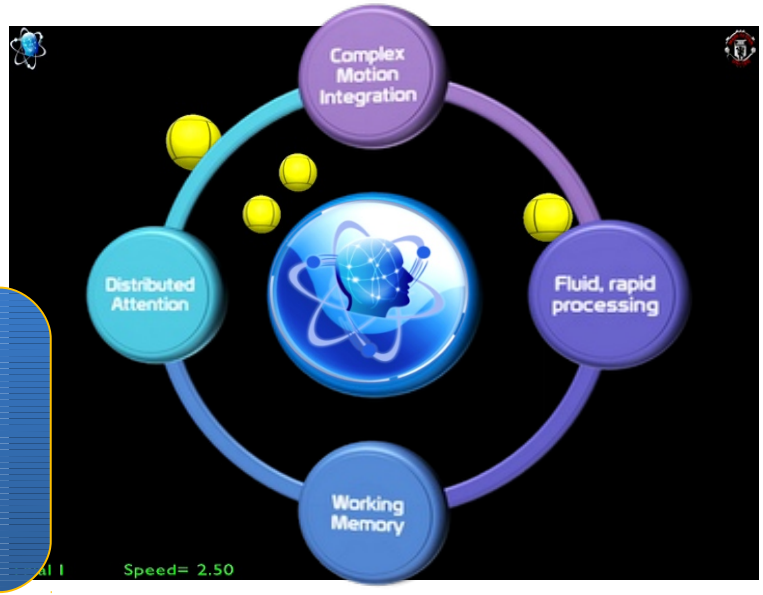
NeuroTracker

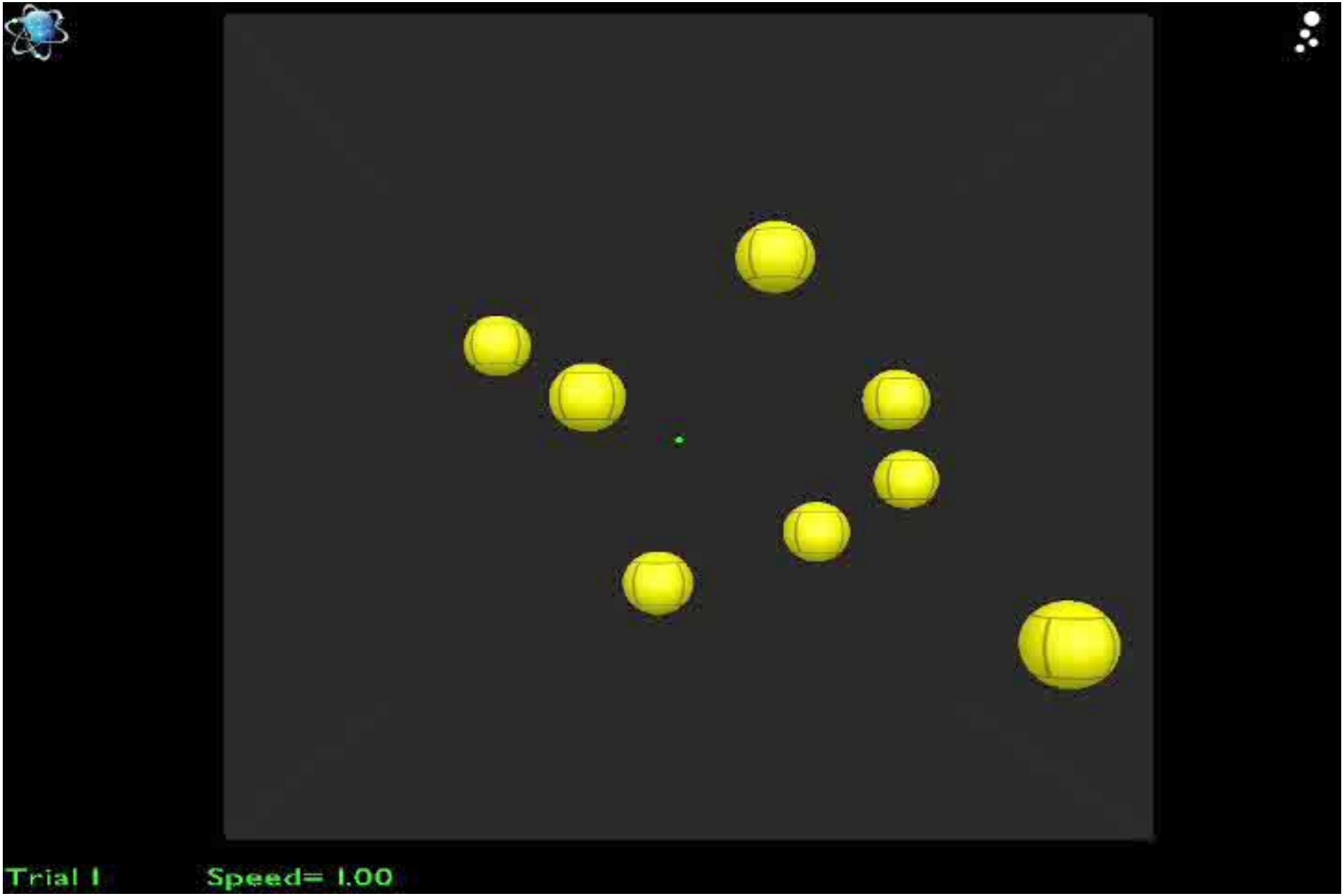






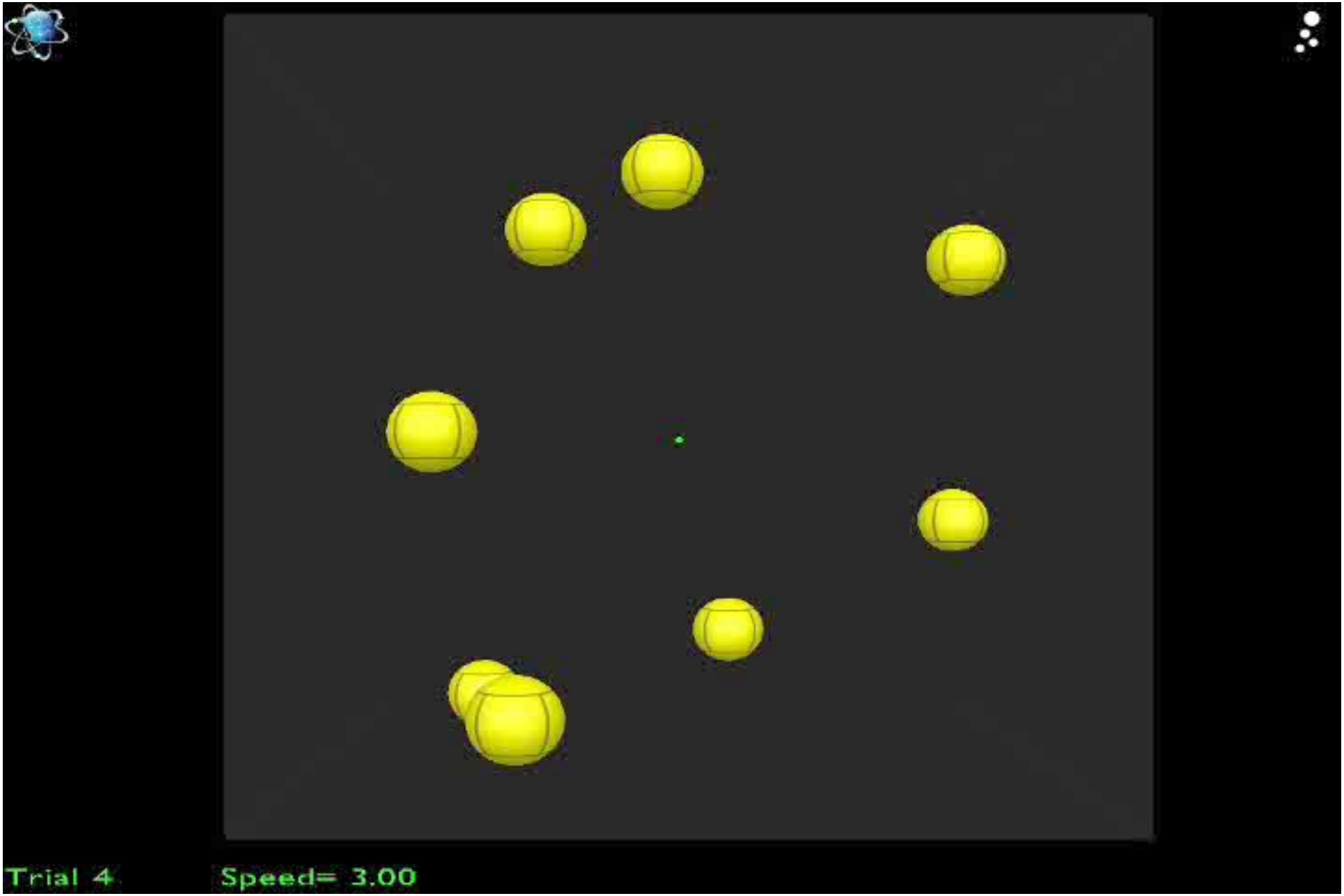




- Test perceptivo-cognitif
- Conditionnement haut-niveau
- Apprentissage distribué
- Amélioration universelle

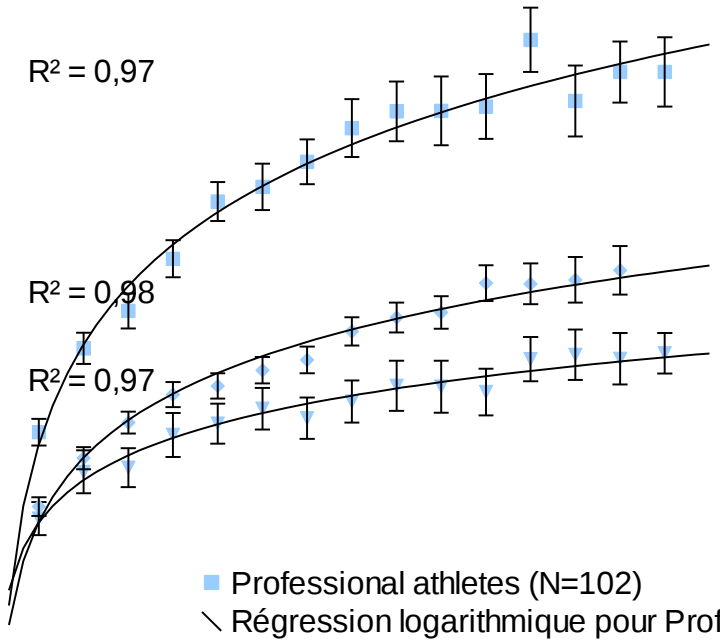


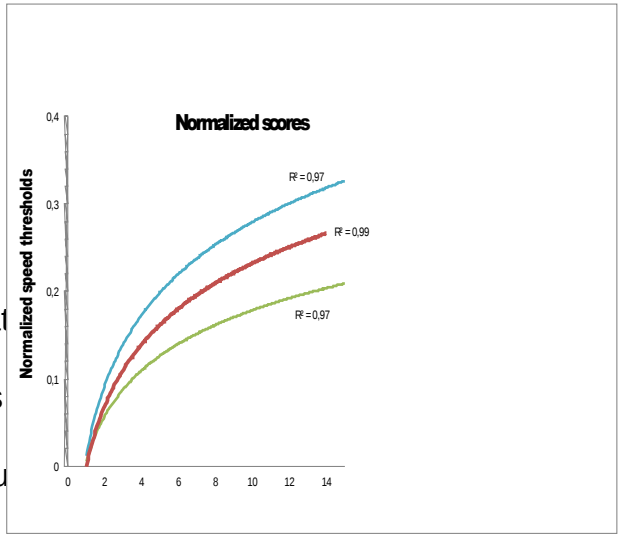

Trial 1
Speed= 1.00


Trial 4
Speed= 3.00

du NeuroTracker en
eau de performance

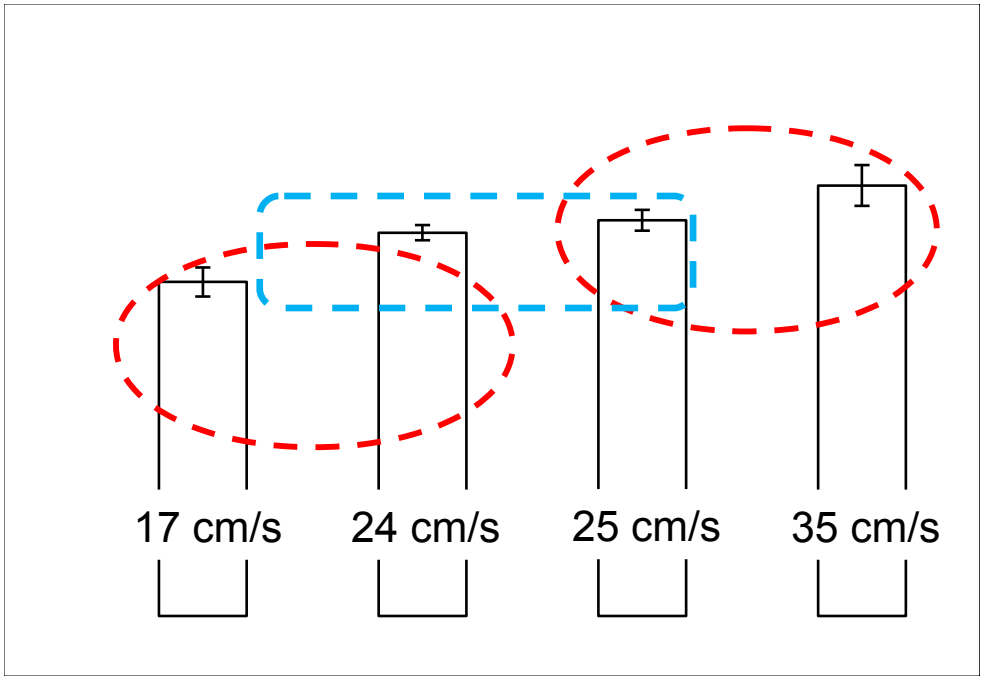
Geometrical Mean Average for Professionnals
High-level Amateur Athletes
& Non-Athletes (university students)

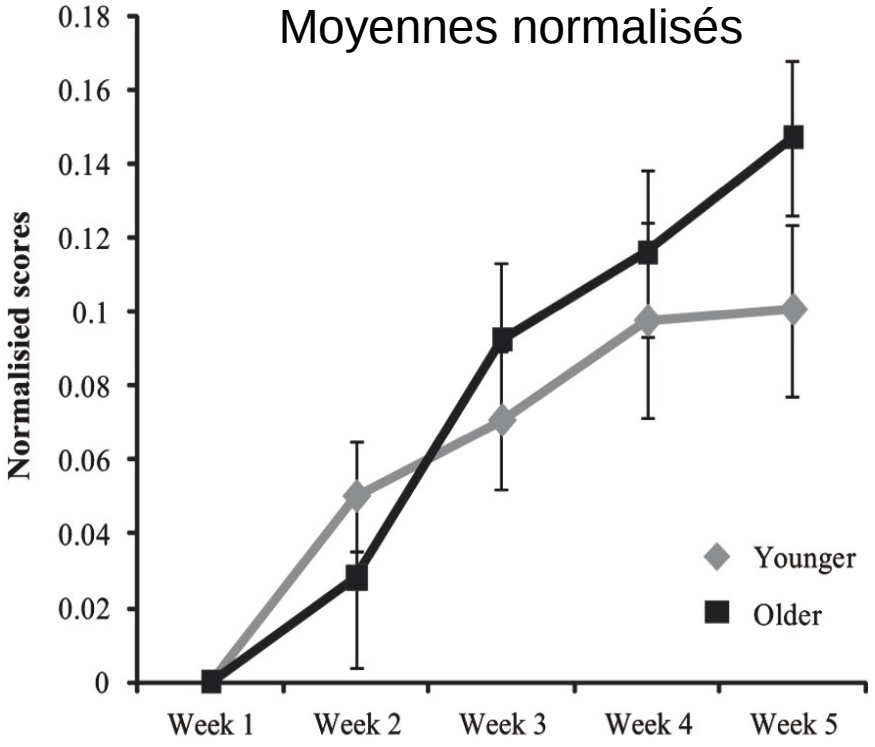




Faubert, 2013

(5 semaines)

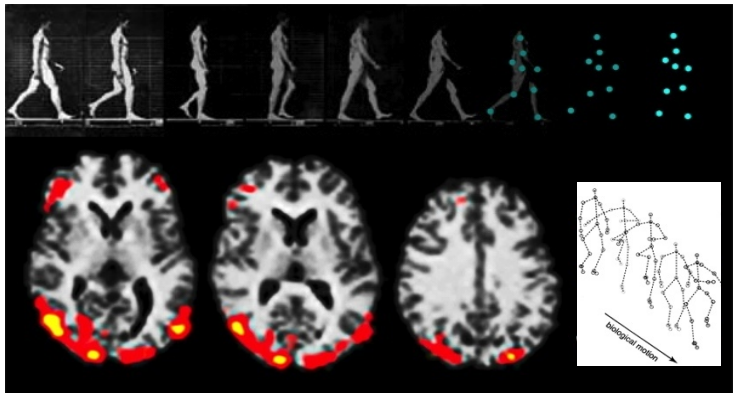




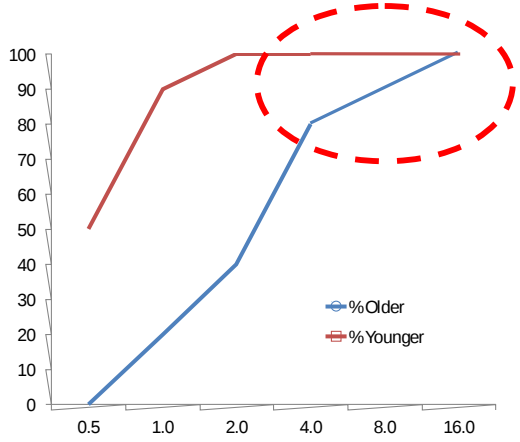
Semaines d'entrainement

Faubert et al., 2009
Legault, et al., 2012

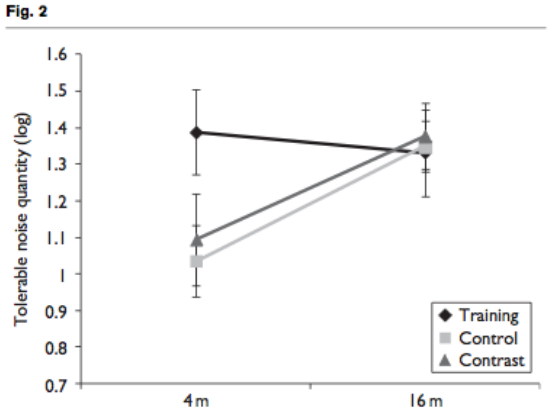
stèmes d’attentions
ités par le NeuroTracker



Prédiction du mouvement humain



Legault, Troje & Faubert, 2012



Legault & Faubert, 2012

Étude
Participants: 4 groupes, Age: 70-85.

Groupes 1, 2, & 3 [*n*=20]:

- *Une collision ou plus.*
- Groupe 1 [NT]:

  -Évaluation + entrainement NeuroTracker + Évaluation **(* Groupe complet N=24)**

- Groupe 2 [NM]:

  -Évaluation + entrainement NeuroMinder + Évaluation

- Groupe 3 [Control]:

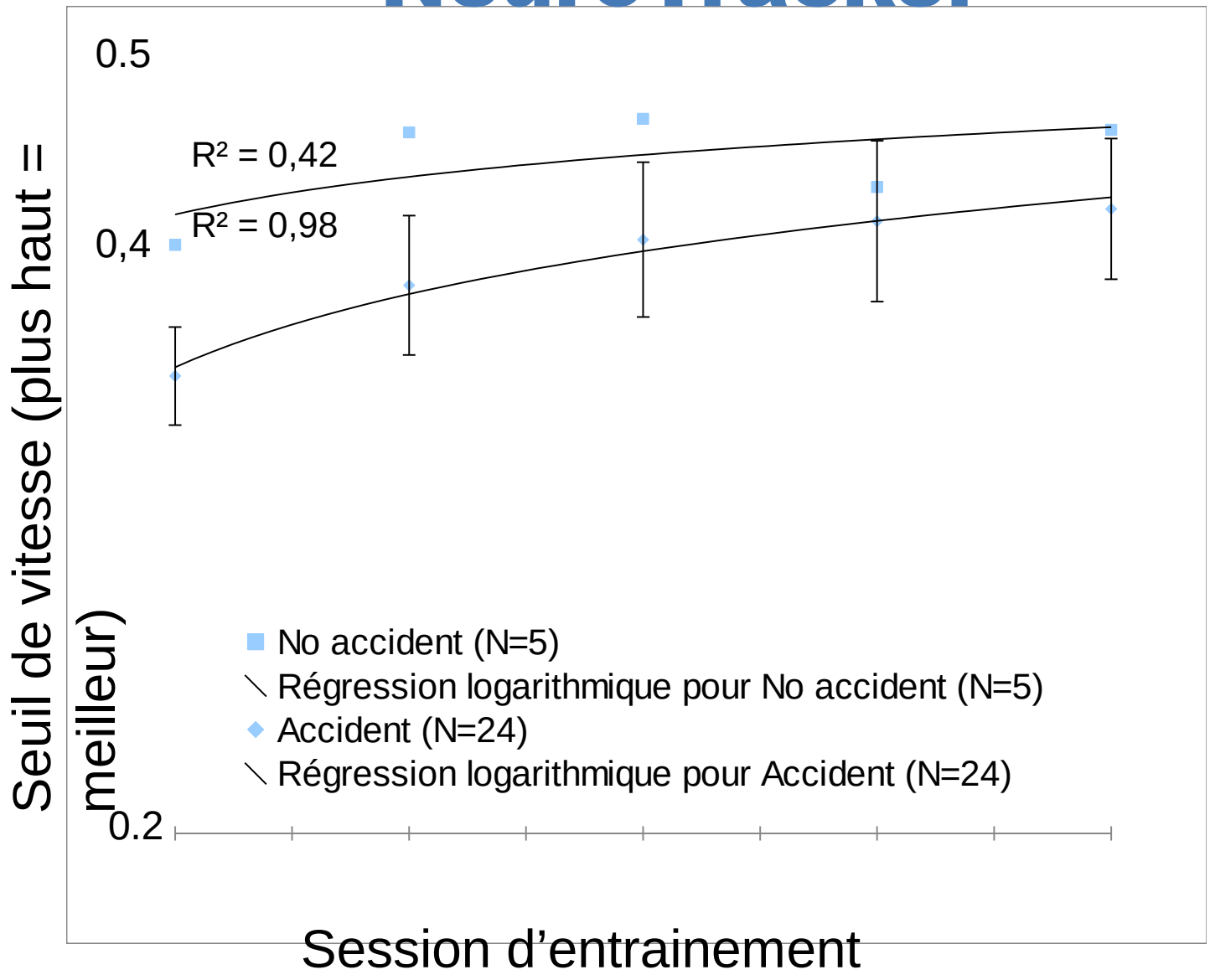
  - Évaluation + Évaluation

Groupe 4 [*n*=20]:

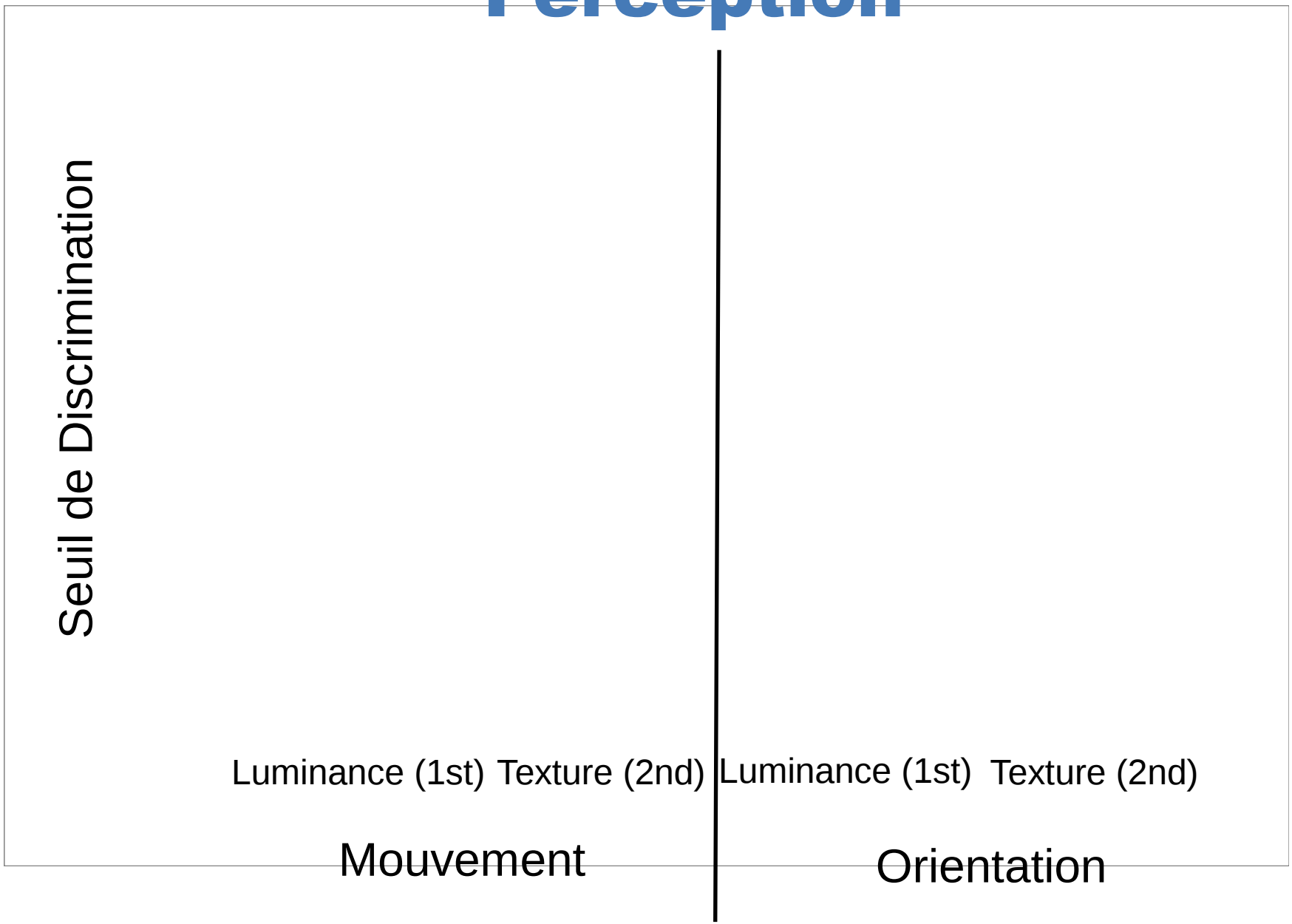
- *Aucune collision ou inaptitude dans les 4 dernières années.*

- Groupe 4 [Control-NT]:

NeuroTracker



Perception

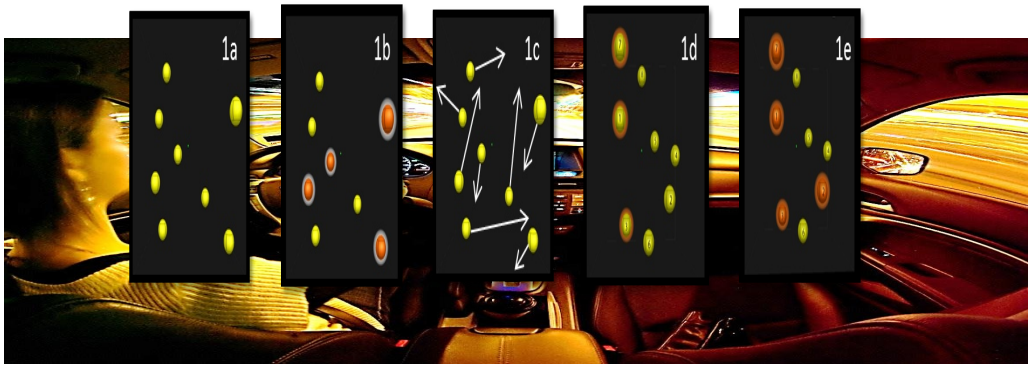

Seuil de Discrimination
Luminance (1st)
Texture (2nd)
Luminance (1st)
Texture (2nd)
Mouvement
Orientation

FIN

MERCI : **FRQSC-SAAQ**

SAAQ study
Perceptual-Cognitive Attributes of Driving

Healthy aging impairs perceptual + cognitive functions



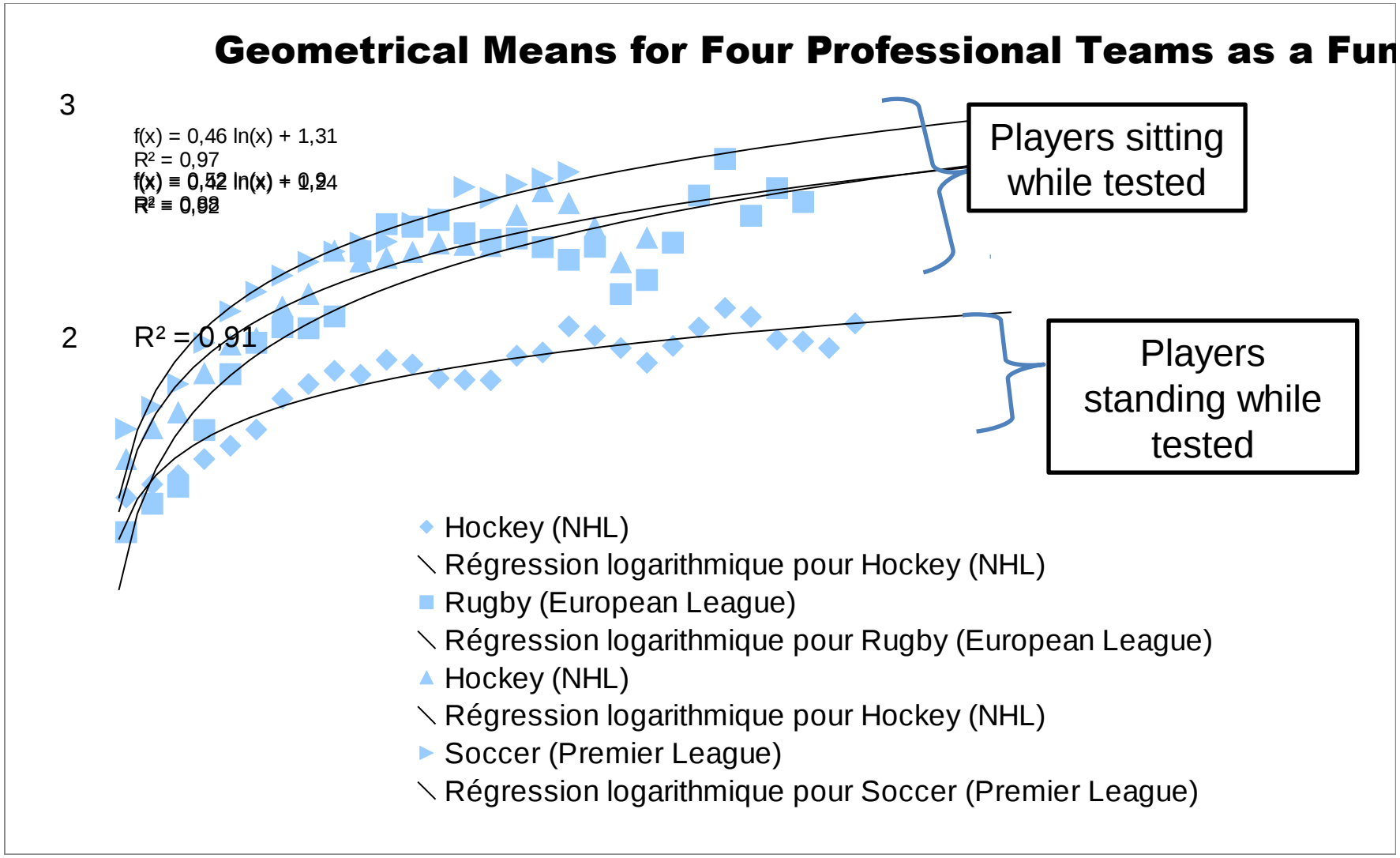
1. Predict driving incidents for 70+
2. Perceptual-cognitive training to improve driving skills?

Société de l'assurance automobile Québec

Driving simulator (Virage simulation)

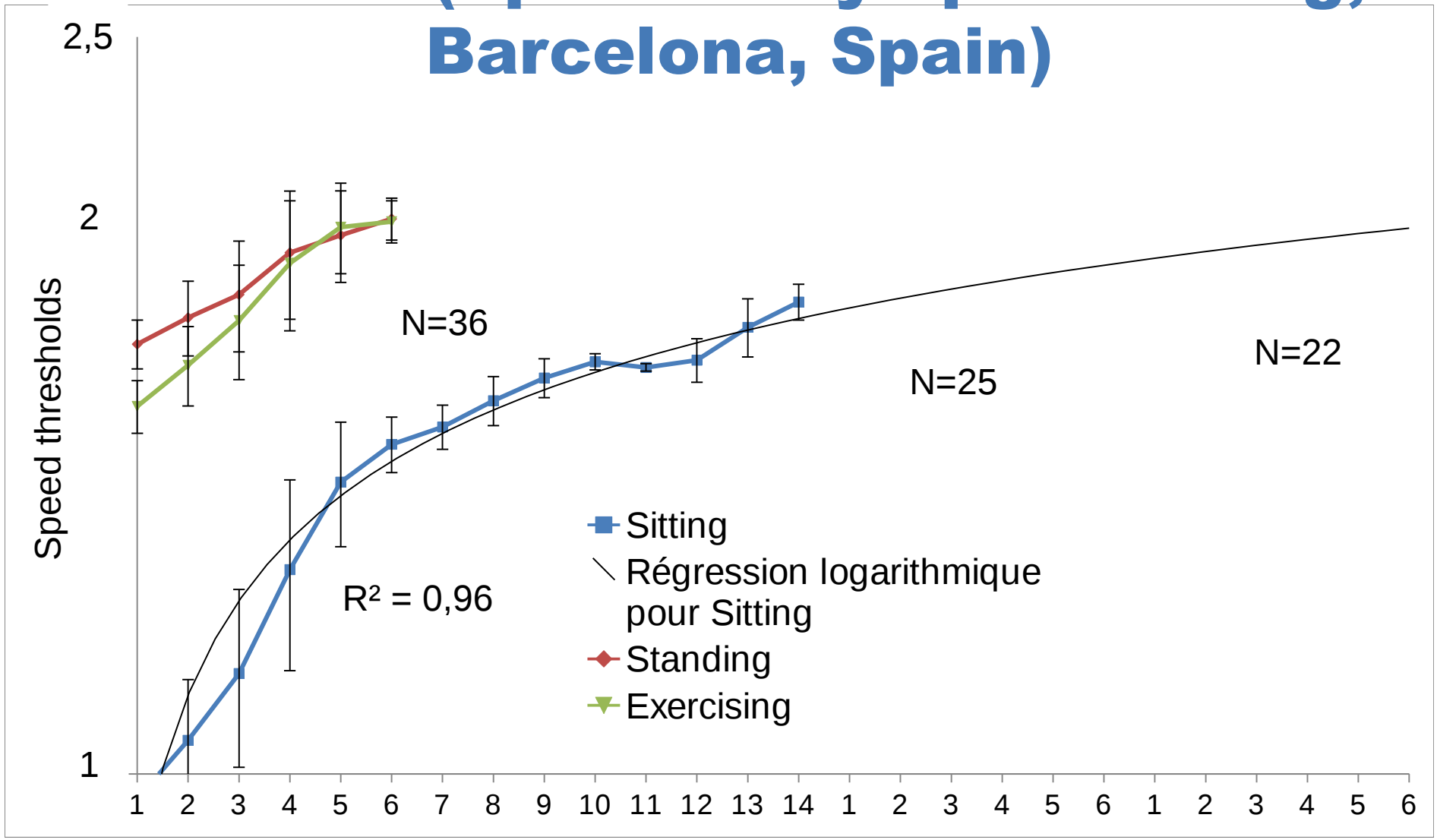
- 180° vision
- Blind spots
- Cockpit movements and vibrations

Professional teams



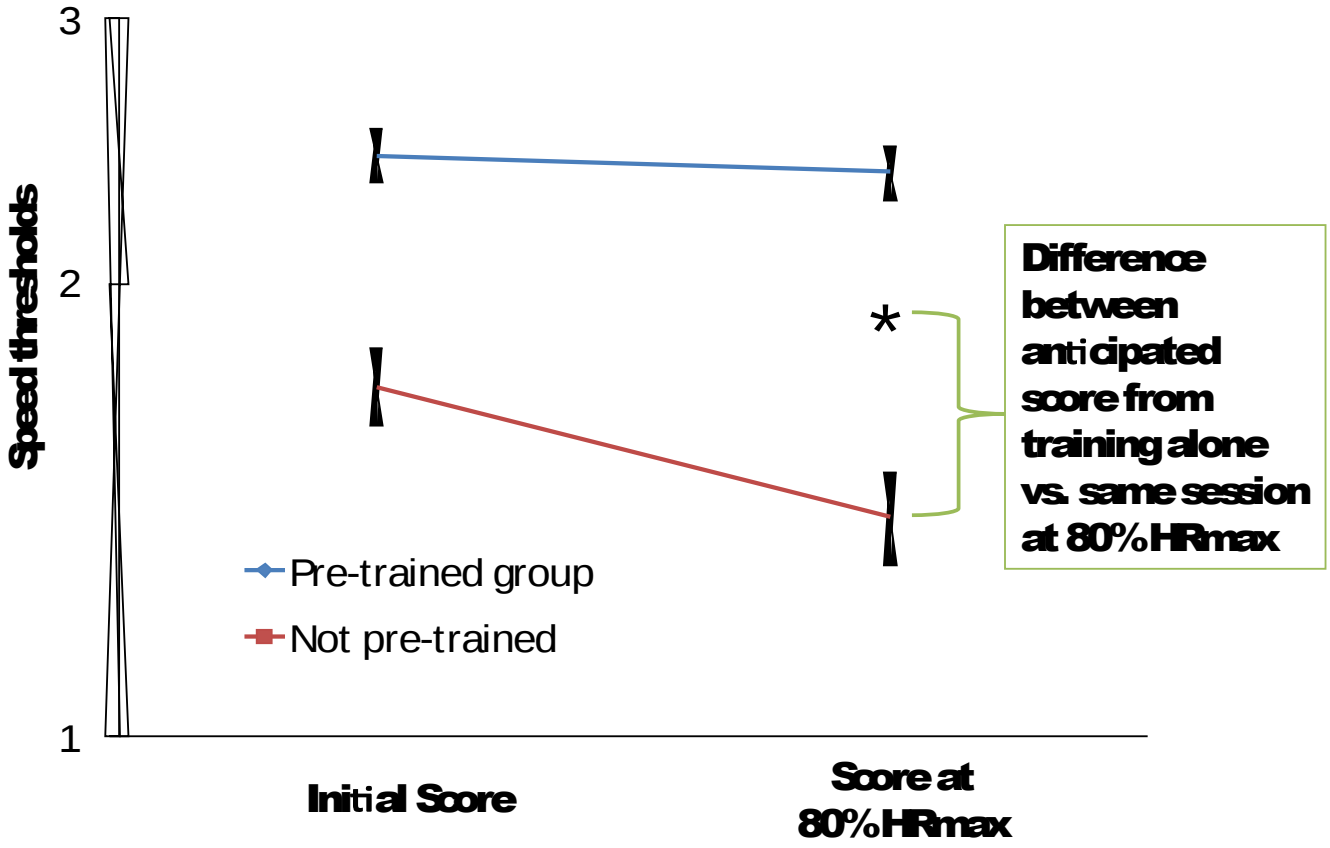
Faubert & Sidebottom (2012)

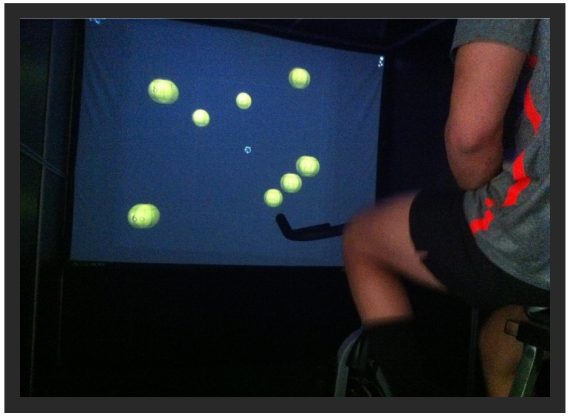
NeuroTracker Training
Athletes (Spanish Olympic training, Barcelona, Spain)



Faubert & Barthes (2013)

Impact of pre-training on cognitive resistance to physical fatigue





Faubert & Barthes (2013)

SAAQ study - Protocol

Week 1 [Evaluation – all participants]:

- Consent form
- Optometric evaluation: visual acuity [ETDRS], visual fields [HVF], stereoscopy [Frisby, Randot]
- Cognitive screening: Mini-Mental State Examination
- Cybersickness questionnaire [SAS]
- Questionnaire: driving behaviour
- NeuroMinder evaluation
- NeuroTracker evaluation
- Car simulator: adaptation driving [AutoRoute & urban]

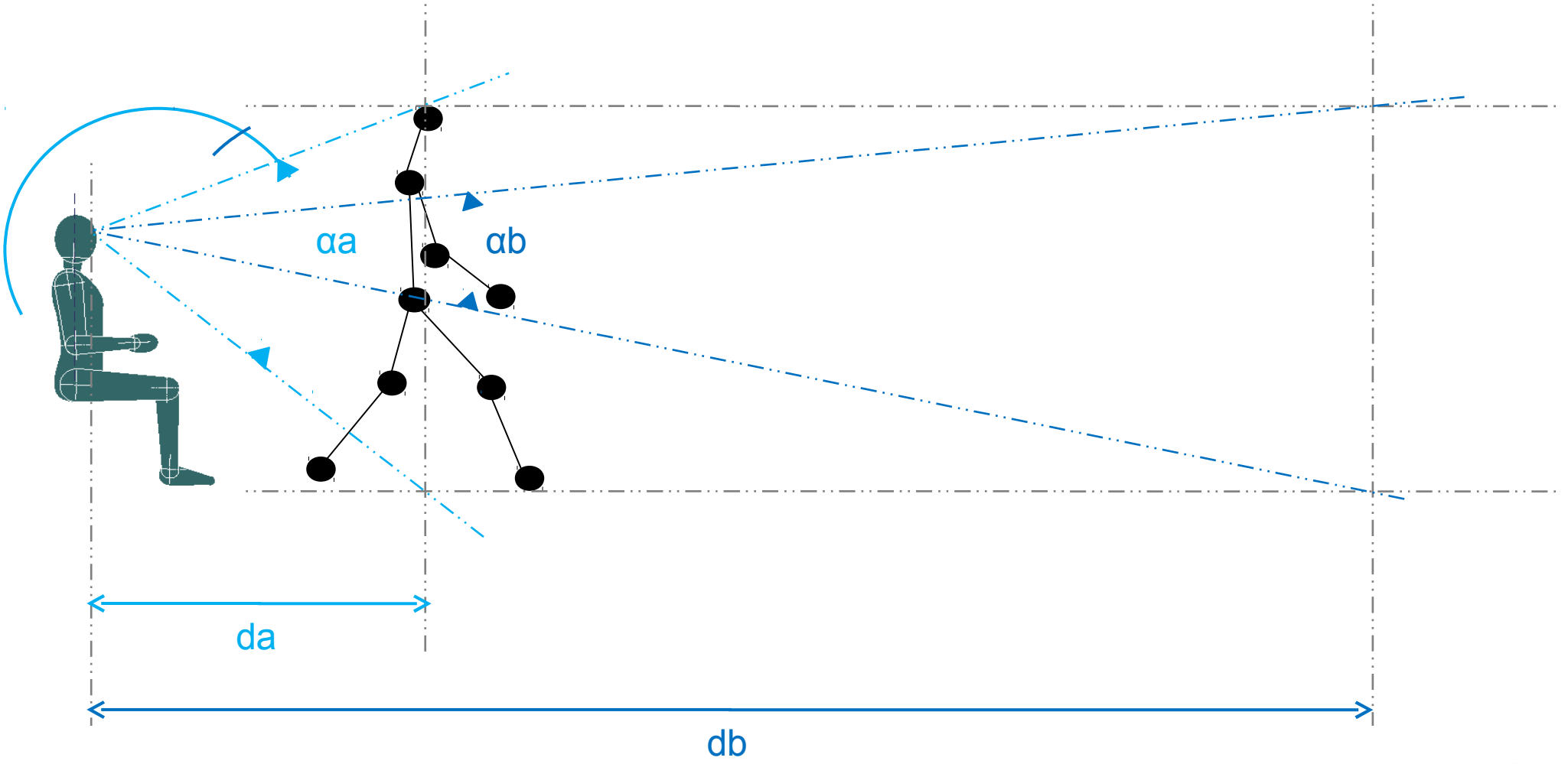
Weeks 2, 3, et 4 [training sessions]

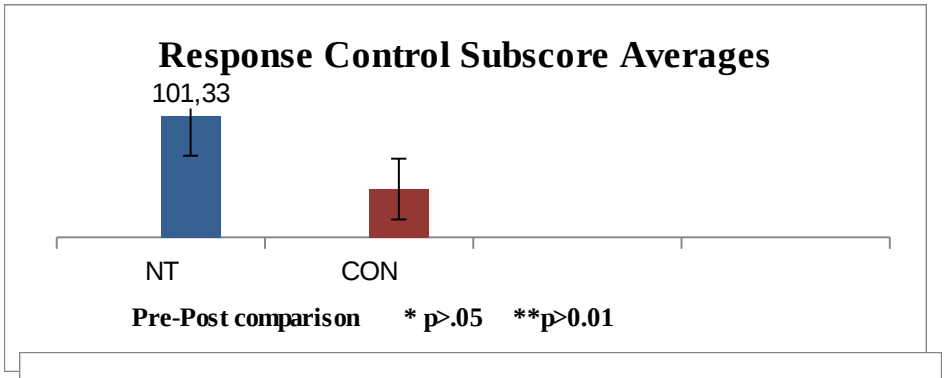
- Groups 1 & 4: NeuroTracker training
- Group 2 : NeuroMinder training

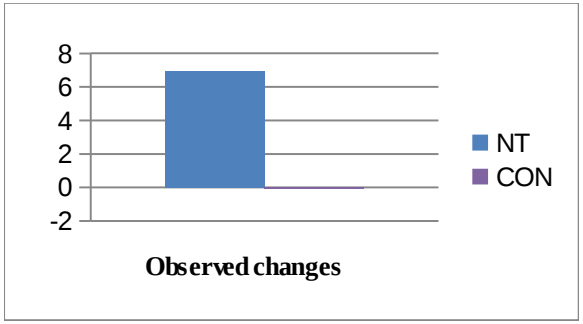
SAAQ study – Protocol, cont.

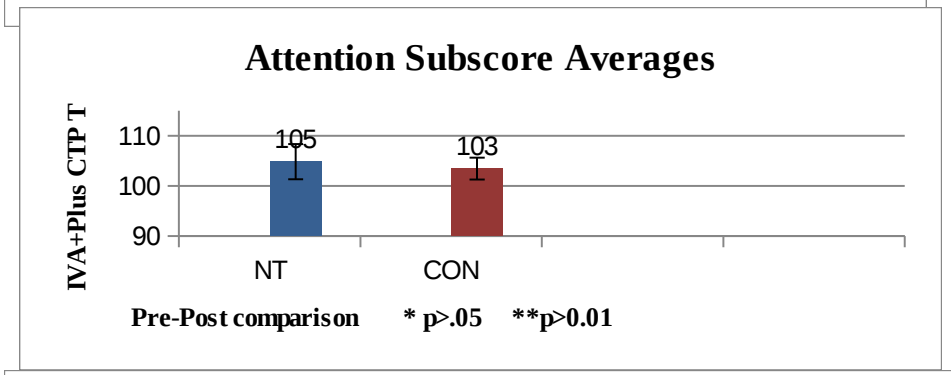
Week 5 [evaluation – all participants]:

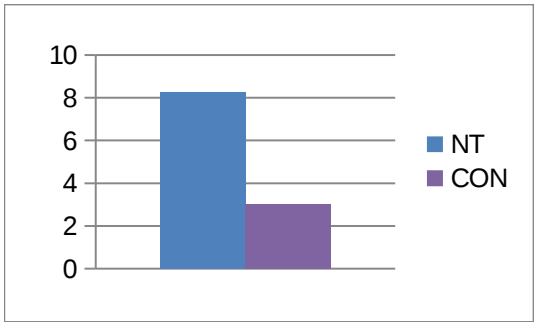
- NeuroMinder
- NeuroTracker
- Driving simulator: evaluation driving scenarios [rural, AutoRoute, & urban]

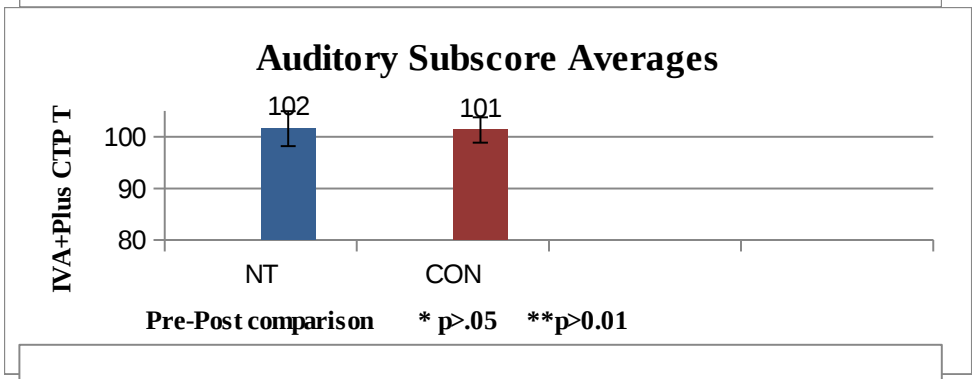

αa
αb
da
db

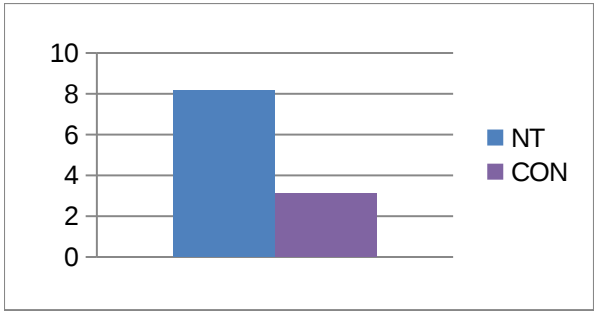

Response Control Subscore Averages
101,33
NT
CON
Pre-Post comparison * p>.05 **p>0.01

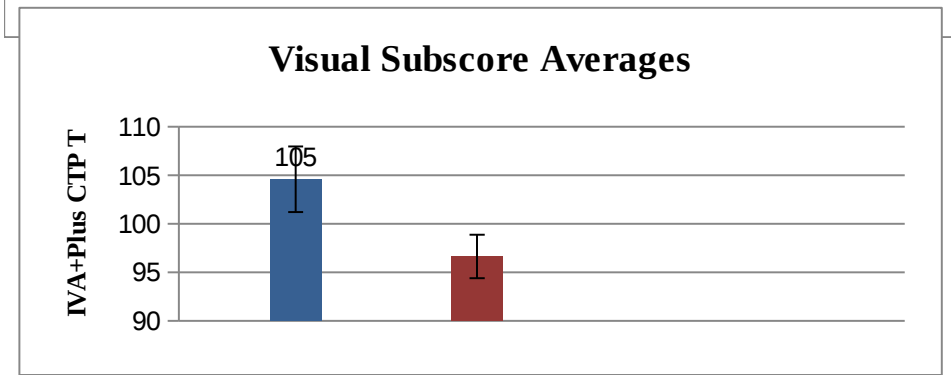

8
6
4
2
0
-2
NT
CON
Observed changes

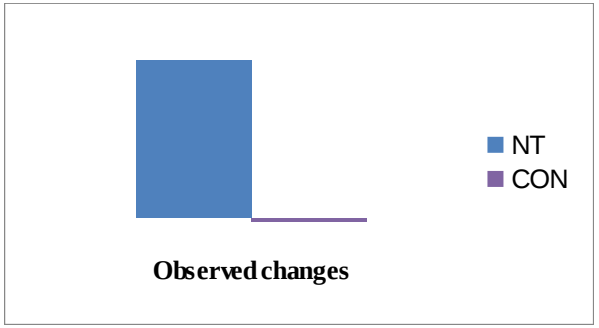

Attention Subscore Averages
IVA+Plus CTP T
110
100
90
105
103
NT
CON
Pre-Post comparison * p>.05 **p>0.01


10
8
6
4
2
0
NT
CON


Auditory Subscore Averages
IVA+Plus CTP T
100
90
80
102
101
NT
CON
Pre-Post comparison * p>.05 **p>0.01


10
8
6
4
2
0
NT
CON


Visual Subscore Averages
IVA+Plus CTP T
110
105
100
95
90
105
NT
CON


NT
CON
Observed changes