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Merging Motor and Cognitive Re-Training in Virtual Rehabilitation – The Rutgers Experience

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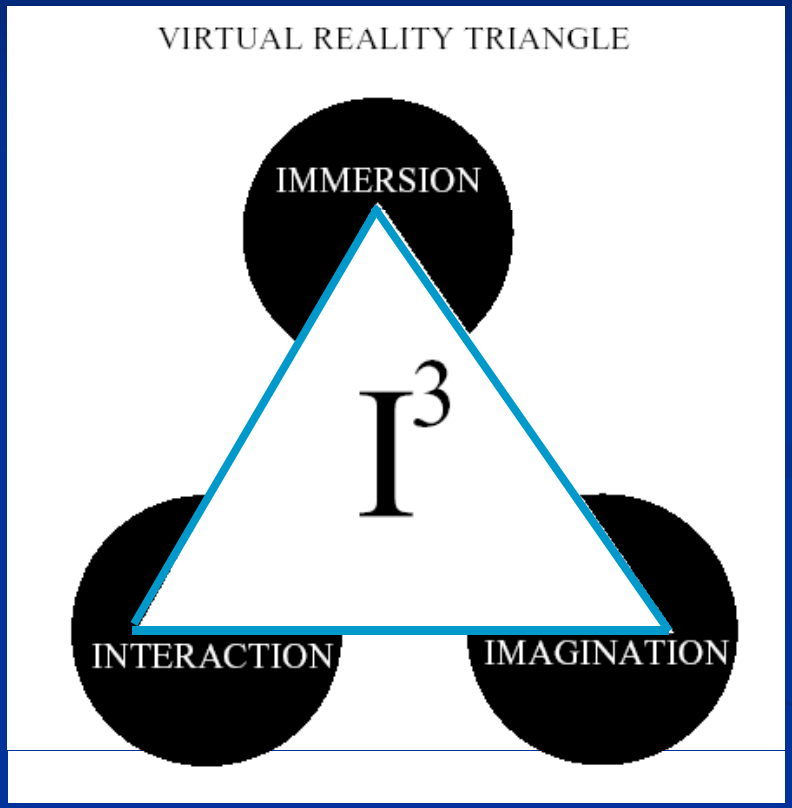
RUTGERS

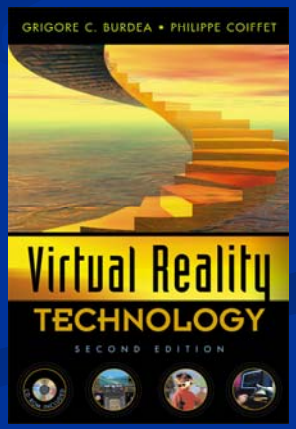
Tele-Rehabilitation Institute

Virtual Reality

Popular definition



My definition

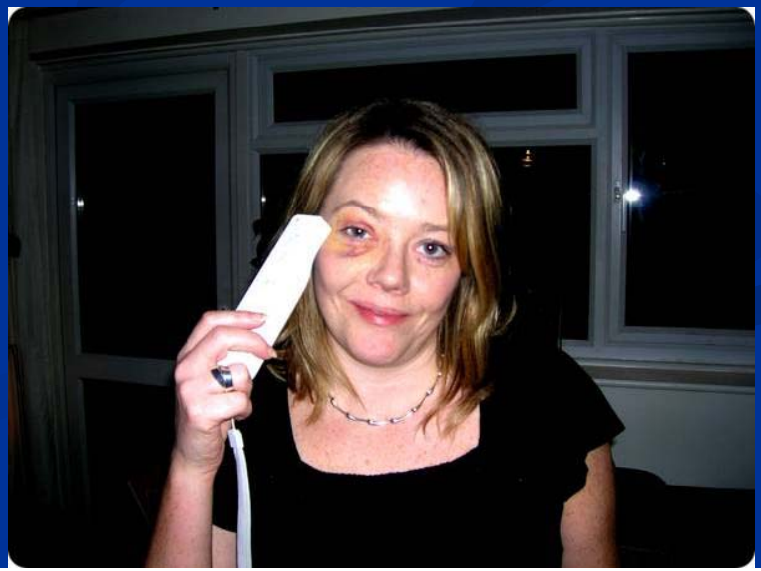


Advantage of Virtual Rehabilitation

- Engaging and motivating (in the form of games)
- Adapts to patients characteristics (if done right)
- Provides rich and timely knowledge of performance
- Allows intensive and long training with less therapist involvement
- Same system can be used for several patient populations
- Mediates convergent therapy = same simulation trains motor, cognitive and psychological deficits

People's idea of Virtual Rehabilitation=Wii

- A young person burns 156% more energy using Wii than being inactive.
- With Wii, heart-rate leaps to 130 beats per minute compared to 85 with the traditional console.
- BUT can induce tendonitis (Wii-itis), can lead to high blood pressure,
- The intensity of game playing can lead to injury



Rutgers Arm or BrightArm™

Fall 2009

Goal– rehabilitation of shoulder and hand post-stroke in the chronic phase

Patients - 4 patients age 46 to 70

All were aphasic,

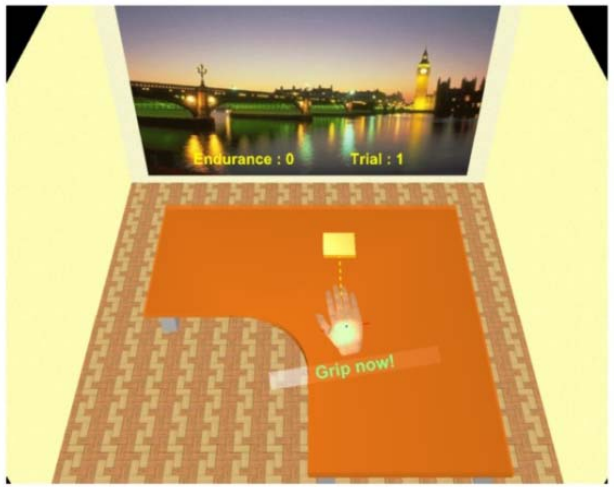
2 had extreme spasticity and no use of their arm,

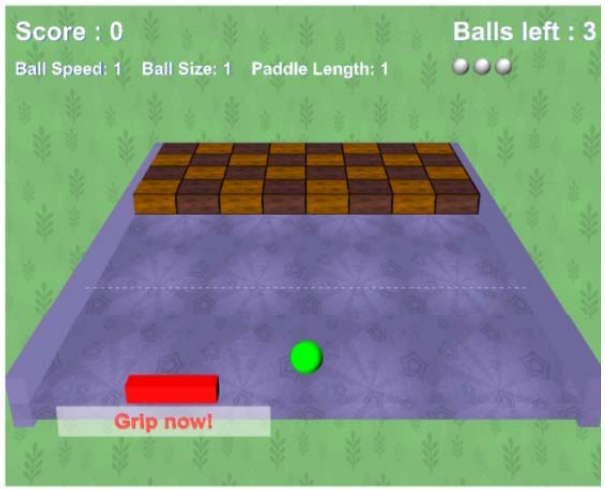
1 had depression and

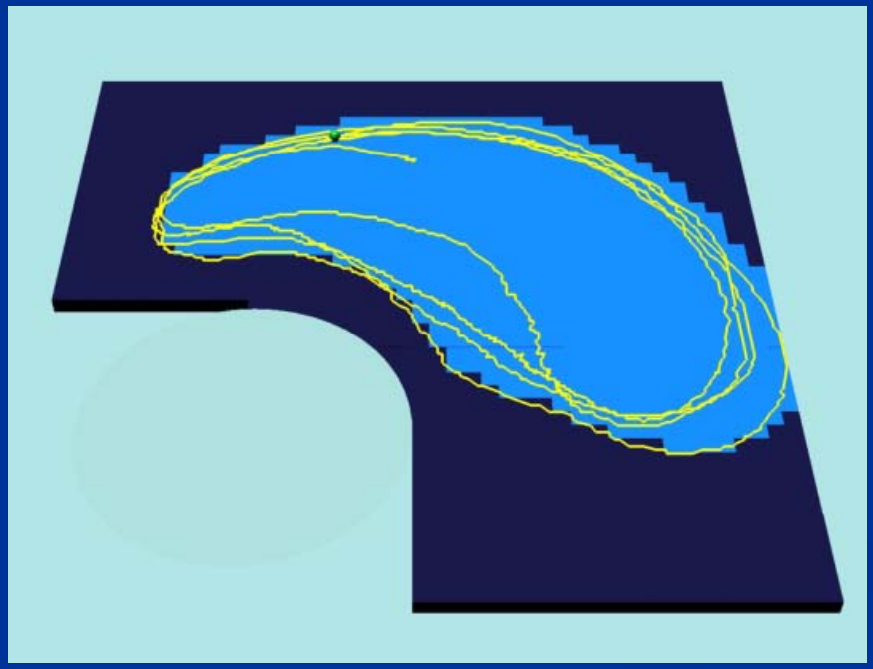
1 had loss of touch and proprioception

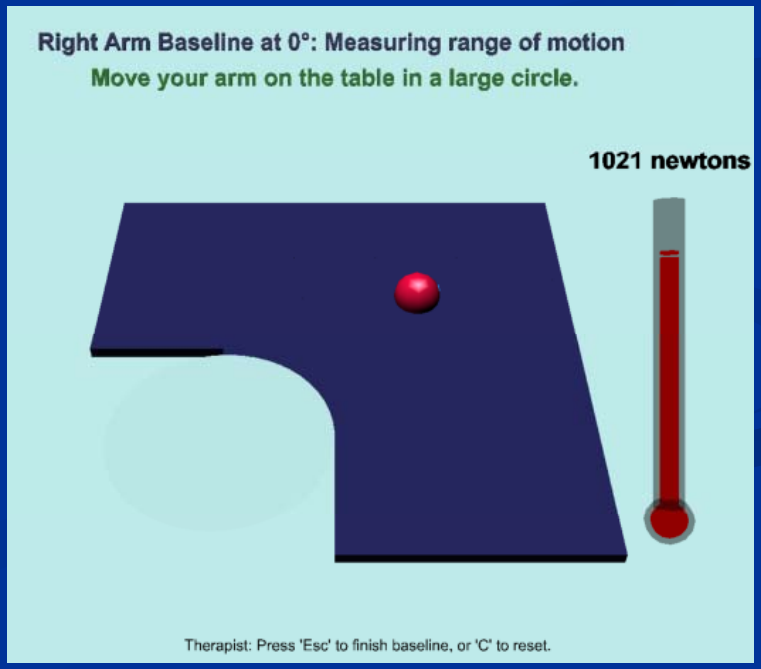
Treatment – 6 weeks (18 sessions of 40 to 60 minutes playing custom video games

Custom VR rehab games









Fall 2009

Therapy progression – table flat fist weeks, then tilted up 10 degrees, then 15 degrees, then 20 degrees.

All games progressed in difficulty (example faster balls or more frequent sand storms)

First no grasp required, then momentary grasp (25% of max) then sustained grasp (10% of max).

Protocol was altered for the spastic patients

Results Fall 2009

	Case 1		Case 2		Case 3		Case 4	
	57 yr male		46 yr female		62 yr male		70 yr male	
Co-morbidities	Aphasic, loss of touch and proprioception		Aphasic, spastic elbow, spastic hand		Aphasic, depression, spastic hand		Aphasic	
Outcomes	Pre	Follow-up	Pre	Follow-up	Pre	Follow-up	Pre	Follow-up
Ambulation	Cane	Cane	independent	independent	wheelchair	Quad	independent	independent
Fugl-Meyer test of UE function	45	50	16	22	12	20	42	51
Grasp strength		-	unable	able	unable	able		50% more
Jebsen		-	unable		unable			17% faster
ADLs tasks (20 total)	Unable 7 No diff 1	Unable 1 No diff. 9	Unable 19	Unable 14	Unable 19	Unable 14	Unable 4 No diff 4	Unable 5 No diff 2

Some 2009 results and patient interview

Burdea et al. JOPTE 2010 (to be published)

Therapy 2030

- An *artificial separation* in clinical practice between physical , occupational rehabilitation, cognitive interventions, speech therapy, and others will be reduced or disappear.
- This is due to the ability of virtual environments to be used in all these specialties, as well as the interconnections between pathologies (example in stroke motor impairments are sometimes associated with aphasia (speech impairment), visual neglect and depression.
- It is only one body, one brain – **exploit the interconnections!**

The Society!

There was something missing – none of the exiting professional societies, either on the clinical side, or on the technology side were dedicated to virtual rehabilitation.

Researchers with such wide background could benefit from more cohesion brought by a dedicated Society.

In 2008 I founded the International Society for Virtual Rehabilitation (**www.isvr.org**), which co-sponsors several international conferences.

There are no dues for two years after joining.

Discount at sponsored conferences

Mulțumesc pentru că ați venit la prezentare!