

Virtual rehabilitation targets variety of diseases

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Many discoveries these days happen at the intersection of different areas of science. The marriage of rehabilitation medicine and virtual reality has created a new domain, which I call virtual

rehabilitation.

While conventional therapy is by necessity repetitive, and disengaging of the patient, virtual rehabilitation uses video games to immerse the patient in interactive worlds. These games are not those found in stores. Rather, they are targeted at different diseases, adapt to each patient, and thus are winnable by the disabled.

For example, a game designed to help those with dementia may target short-term memory by replicating a card-pairing game. Another game for the elderly might ask them to solve simple subtractions, in the form of cubes with numbers on them.

If the person had survived a stroke, then the games will address the need to improve motor control of their affected arm, or its endurance. Such games might ask the patient to pick a virtual ball and place it on a matching color target, while following a prescribed line.

Or the patient might be asked to dig



AP PHOTO

Will Mason, editor in chief of UploadVR, shoots with a virtual reality gun at the E3 Electronic Entertainment Expo in Los Angeles in June.

out treasures on a virtual island, fast enough so they are not covered again by a looming sandstorm. The sound of waves in the background subliminally relaxes the patient, and fireworks pop once all treasures were discovered. With repeated successes the patient's well-being improves, and depression severity goes down, all without additional medication.

What is the "secret" behind virtual rehabilitation successes? Scientists be-

lieve that the repeated actions induced by the therapeutic games result in a reorganization of the brain neuronal connections. This brain "rewiring" is believed to persist even after the games stop, resulting in lasting benefits. Some scientists call this a disruptive technology, unlike pharmacological therapies, which in the case of dementia, lose effect in less than a year.

It is no wonder that conventional medicine regards this new treatment

with some caution. Some diseases previously considered incurable have been shown to benefit from virtual rehabilitation. Examples are elderly who improved their arm use years after their stroke or adolescents with cerebral palsy who were able to use their arm for the first time after virtual game play. Sufferers of chronic pain were able to return to the workforce after such novel therapy, in the absence of controversial opioid-based pain medication.

A rare disease is Primary Progressive Aphasia, a form of dementia that affects men in their 40s and 50s. This devastating disease is considered by conventional medicine incurable. Yet one such individual was able to read again and recognize colors again after eight weeks on a system called "BrightBrainer," being developed by my company.

The path to some of the discoveries mentioned above started with my work at Rutgers School of Engineering, and later through industry research at my company. But there are many others working hard to develop new virtual reality therapies. They formed the International Society on Virtual Rehabilitation. There is a great need to advance medicine and virtual reality appears to be one solution.

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