Modification and Enhancement of Consciousness

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Introduction

- Scientific research on consciousness is looking for brain patterns that are correlated with consciousness.
- When these have been identified, it will become possible (at least in theory) to modify or enhance consciousness by changing the correlates of consciousness in the brain.
- This talk is a highly speculative exploration of this possibility.

Talk Overview

- Interpretation of consciousness as a virtual reality bubble.
- Techniques for the modification and enhancement of consciousness.
- Types of modification.
- Discussion

Phenomenology

- Our conscious experiences are spatially organized in a rough bubble shape that morphs to fit the shape of our surroundings (Gamez 2007; Lehar 2002).
- This bubble can vary independently of the actual physical environment.
- For example, in dreams and hallucinations.

CONSCIOUSNESS

Flat Environment
Number of reasons for thinking that we do not directly perceive the world:
- Dreams
- Out of body experiences
- Hallucinations
- Physical world is colourless, odourless, soundless, etc.

More plausible to think that our experiences form a kind of virtual reality bubble.
This can be linked to sensory information (online perception) or operate offline, in dreams and imagination.

Phantom limbs and out of body experiences strongly suggest that we do not directly experience our real body.
We experience a virtual body that is constructed in response to signals received from the senses.
Consciousness and the Brain

- Consciousness is this virtual reality bubble.
- Lots of evidence suggests that its level of intensity and contents are tightly correlated with brain activity.

Modification and Enhancement of Consciousness

- Change consciousness from within consciousness (changes in the brain will occur at the same time).
- Change consciousness by modifying the brain.

Why Modify and Enhance Consciousness?

- Scientific benefits:
  - More controlled experiments on the correlates of consciousness.
  - Explore the limits of our consciousness.
  - Find out what it is like to be a bat.

Motivation

- For fun and pleasure
- Virtual reality bubbles are spaces where we can do anything, be anything, realize every fantasy and desire.
- Pretty much everything that people are hoping for in heaven can be achieved here on earth by modifying our consciousness.
**Motivation**

**Sensory Input**
- Change virtual reality bubble by modifying input to the senses.
  - For example:
    - Alter the physical world (acquire political power, watch a film, go on holiday, etc.)
    - Virtual reality
    - Sensory substitution systems
    - Manipulations of the senses in experimental psychology

**Brain Modification**
- Has been suggested that we could enhance brain by implanting silicon chips.
- Or upload brain onto computer – this would provide limitless possibilities for modification and enhancement.

**Brain Modification**
- Alter brain chemistry:
  - Caffeine, alcohol, hallucinogenic drugs
- Large scale stimulation:
  - Direct current stimulation (DCS)
  - Transcranial magnetic stimulation (TMS)
  - Ultrasound
- Alter firing patterns of individual neurons:
  - Electrodes (~200 neurons)
  - Optogenetics (~10,000 neurons)

**Problems with Implanted Chips and Brain Uploading**
- An uploaded brain is unlikely to be correlated with the same consciousness as the original brain.
- While chips or computers can modify brain activity, it is unlikely that consciousness could extend onto the chip.
- Draft papers on this topic available on request.
Mental Focus and Control
- Can mentally will changes to our virtual reality bubble.
- For example, imagine a fish.
- Meditation improves mental focus and control.
- Many 'how to' guides.
- Typically requires years of training to achieve stable vivid conscious experiences.

Lucid Dreaming
- Virtual reality bubbles are more malleable during dreams.
- Lucid dreamers can control these changes to some extent.
- Variety of techniques for improving one's ability to lucid dream.

Normal Level of Consciousness

Low Level of Consciousness

High Level of Consciousness
**Methods**

- Increase level using:
  - Physical stimulation (slap in the face with a wet fish)
  - Chemicals (hallucinogens, caffeine, amphetamines)
- Decrease level using:
  - Physical stimulation (blow to the head)
  - Chemicals (sedatives, anaesthetics)

**Potential Limitations**

- The level of consciousness is likely to be linked to neuron properties.
- This could limit the maximum level.
- For example, if consciousness level is linked to neuron firing rate, the maximum level will be limited by metabolic constraints.

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**Normal Perception: Virtual Body Matches Real Body**

**Body**

**Relocate Body**

**Methods: Body location**

- Dreaming.
- Body trauma (near death experiences).
- Ketamine (Wilkins, Girard and Cheyne 2011).
- Brain damage and electrical stimulation of brain areas (Blanke and Arzy 2005)
Sensory Manipulation: Rubber Hand Illusion

Out-of-Body Experience through Sensory Manipulation

Ehrsson 2007

Mental Control

Resize Body

Body Shape and Type

Methods: Body Size and Shape

- Muscimol (Amanita Muscaria).
- Mental control + atropine/scopolamine (Castaneda 1970)?
**Body Size**
Van der Hoort et al. (2011)

**Mystical States**
- The entire virtual reality bubble can be perceived as being part of the body.
- Sense of union with the environment.
- Discussed in many mystical traditions.

**Virtual Reality Bubble**

**Limitations**
- The subject has little control over these virtual body modifications when they spontaneously occur.
- Years of training are needed to achieve stable modifications over extended periods of time.

**Normal Perception: Contents Match Environment**
Mismatch Between Contents and Environment

Contents

Methods
- Dreams.
- Imagination.
- Hallucinogens.
- Mental focus and control – e.g., St Teresa of Avila (1987).
- Brain stimulation – TMS is a simple example.

Limitations
- Hard to alter contents in a stable and consistent way for extended periods of time, even with chemical changes to the brain.
- Modified contents are often less vivid than online contents (dreams, imagination).

Expansion of Virtual Reality Bubble
**Expanded Perception of Visual Space**

- Similar brain areas are likely to be used for perception and hallucination/imagination.
- The amount of information in the brain is likely to be fixed by its size and the resolution of each sense.
- Would need more brain tissue to expand our virtual reality bubbles without loss of resolution.

**Novel Sensations**

- Elsewhere I have argued that conscious sensations are correlated with sensory patterns that have been learnt by the cortex.
- A novel pattern of sensory stimulation could produce a novel conscious sensation.
- This might have to be learnt by the cortex, (difficult in an adult).

**Methods: Novel Sensations**

**Structuring of Information by the Senses**
Cortex Trained by Structured Information

Conscious Sensations Correlated with Learnt Patterns

Conscious Sensations Correlated with Learnt Patterns

Producing Novel Conscious Sensations

Producing Novel Conscious Sensations

Producing Novel Conscious Sensations
Novel Senses and Sensory Substitution Systems

- Novel patterns could be fed in through the existing senses – a form of sensory substitution.
- For example the feelSpace belt gives subjects information about location of North (Nagel et al. 2005)
- Magnetic implants in fingertips enable people to feel magnetic fields.

feelSpace Belt

Magnetic Fingertip Implants

Limitations

- Not clear that sensory substitution gives people new conscious sensations.
- Probably because the information is still processed through existing senses – it is not being directly fed into the cortex.
- Might be possible to cancel out the existing senses using an inverse model.
- Draft paper on this available on request.

Types of Modification

- The present moment has a temporal thickness (the specious present).
- This can be expanded and contracted to include more or less events.
- Could also enhance access to previous times (long term memory).
Methods

- Not clear how this could be done with short term memory, which comes in different kinds.
- Examples of people with expanded long term memories – hyperthymesia (Parker et al. 2006)
- Borges’ Funes the Memorious is a fictional example.
- Expansion of long term memory is possible, although it typically comes with a diminution of other abilities.
- People drown in the past if it is too freely available.

DISCUSSION

Summary

- Modifying or enhancing our consciousness could be great.
- I have sketched out some of modifications and enhancements of consciousness that might be possible in principle.
- But there are many limitations...

Limitations

- Brain interventions are too dangerous for humans and promise too few rewards.
- Drugs can only produce stable vivid modifications of consciousness in combination with mental control.
- Dreams and imagination are washed out, unstable and difficult to control.

Future Directions

- Could address these limitations through more scientific work on the correlates of consciousness.
- Develop mathematically formulated theories that can predict conscious states based on brain states.
- Might open the way to more accurate and stable modifications and enhancements of consciousness.

Limitations

- Mental control is difficult, takes many years to master.
- By the time you have mastered it, your desire to romp with houris in paradise will probably seem pretty trivial.
- At the present time, the easiest way to change consciousness is through modifying sensory input. Enter virtual reality, go to a movie.
More than we can Imagine

- We use our imagination to think about what changes to consciousness might be possible.
- Our knowledge about our ability to modify consciousness is limited by our ability to modify our consciousness.
- The most interesting modifications and enhancements of consciousness cannot be imagined.

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More Information

- This talk is based on a couple of papers that I am preparing for publication - can send copies on request.
- Slides: www.davidgamez.eu/talks/ 
- Other papers related to this material: www.davidgamez.eu/publications/
- Feel free to contact me if you have any questions: david@davidgamez.eu

References