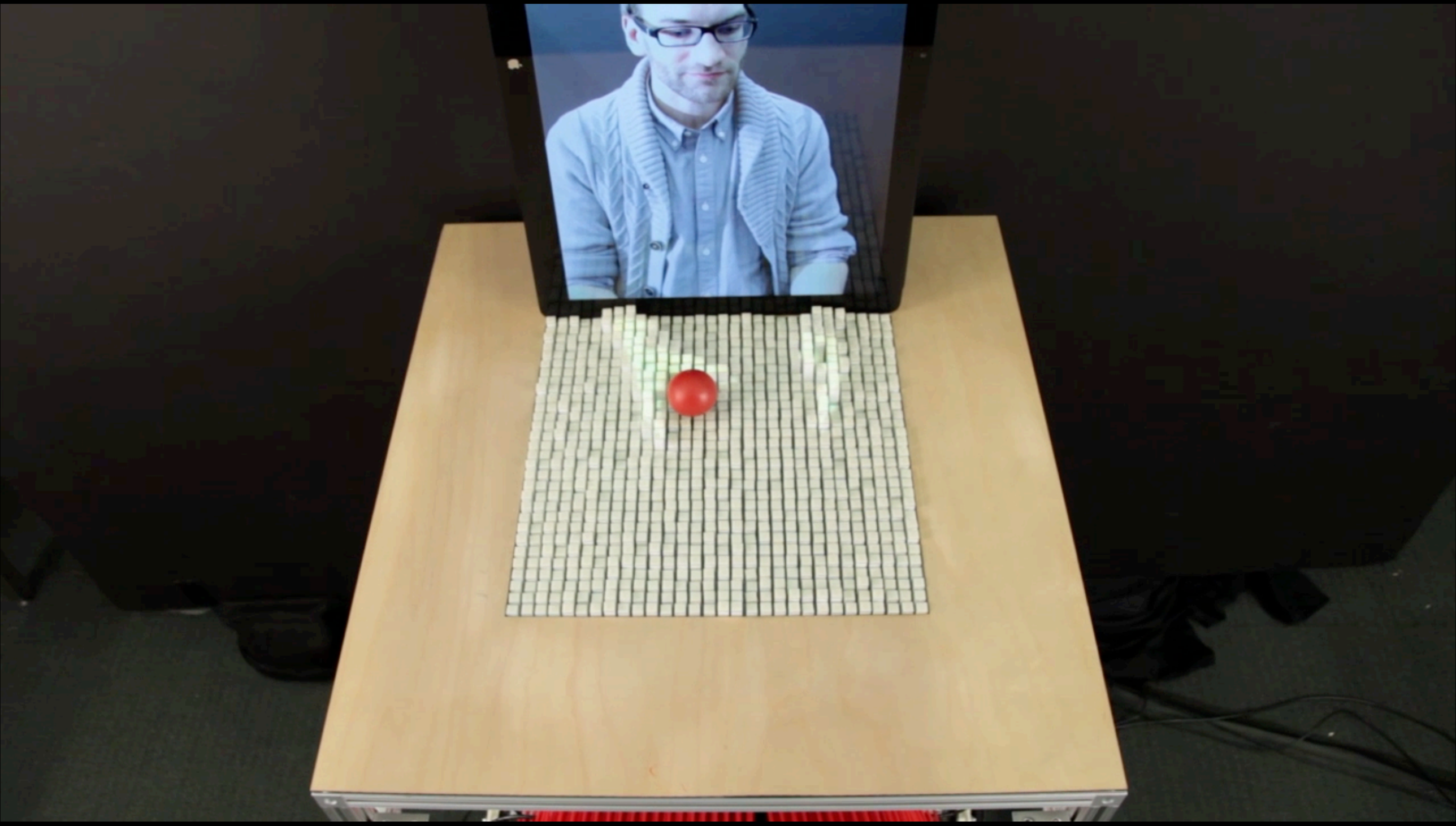
Physical Computing 2022

Physical Computing: sensing and controlling the physical world with computers

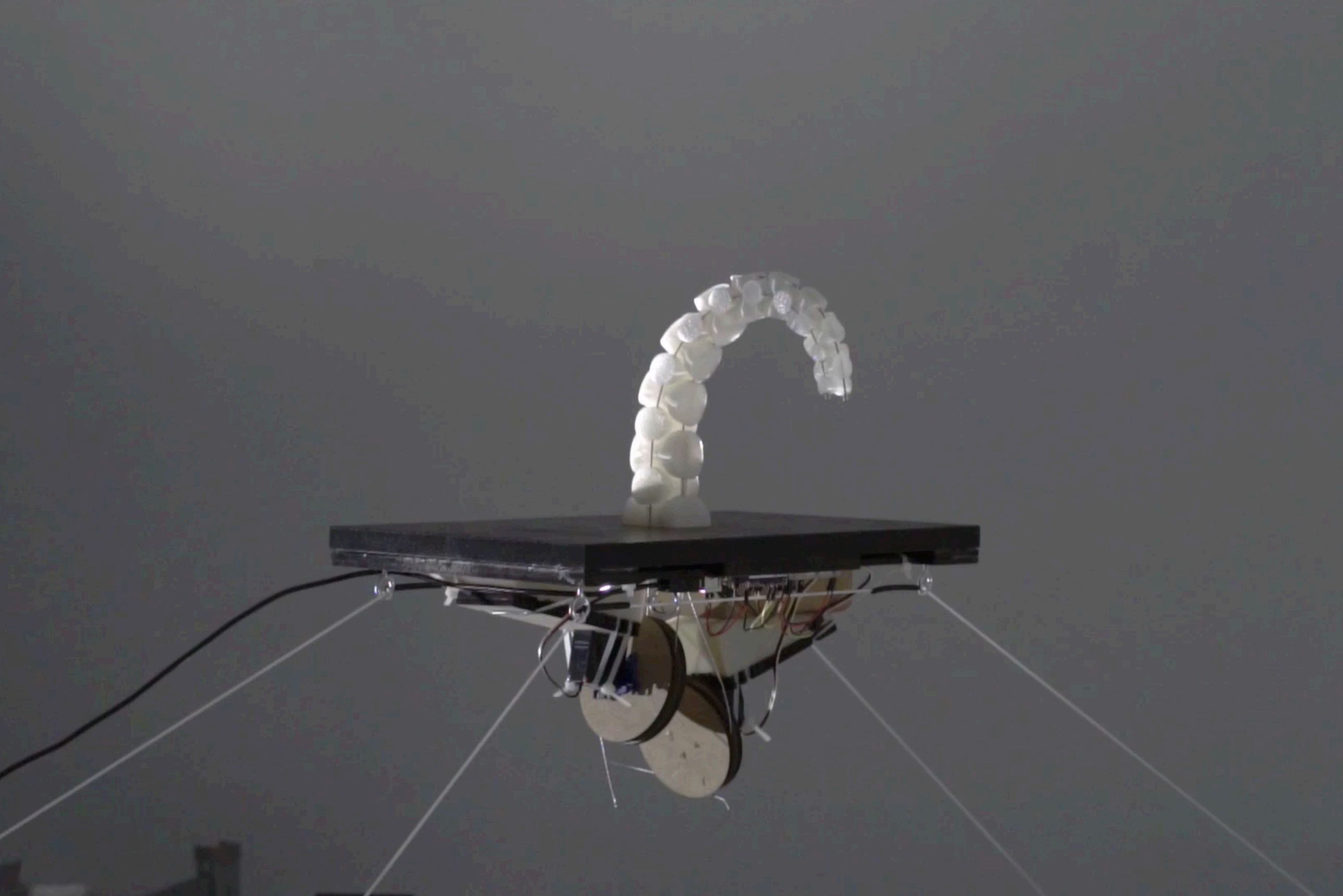
Dan O'Sullivan and Tom Igoe

inFORM - Tangible Media Group MIT



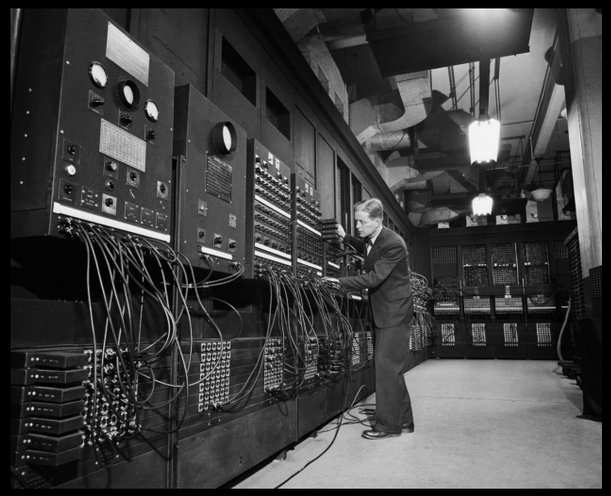
Birdly - flight simulator

TOFI - Mouth Computer Interface



Human Computer Interactions

Paul Dourish



Electrical

```
Ó 0380
. 00380   E6 3D      INC  $3D
. 00382   D0 02      BNE  $0386
. 00384   E6 3E      INC  $3E
. 00386   8D 01 FF   STA  $FF01
. 00389   A0 00      LDY  #$00
. 0038B   B1 3D      LDA  ($3D),Y
. 0038D   8D 03 FF   STA  $FF03
. 00390   C9 3A      CMP  #$3A
. 00392   B0 0A      BCS  $039E
. 00394   C9 20      CMP  #$20
Ð
. 00396   F0 E8      BEQ  $0380
. 00398   38         SEC
. 00399   E9 30      SBC  #$30
. 0039B   38         SEC
. 0039C   E9 D0      SBC  #$D0
. 0039E   60         RTS
. 0039F   8D A6 03   STA  $03A6
. 003A2   8D 01 FF   STA  $FF01
. 003A5   B1 00      LDA  ($00),Y
. 003A7   8D 03 FF   STA  $FF03
. 003AA   60         RTS
```

Symbolic

```
16
17  // Jitter class
18  function Jitter() {
19
20    this.x = random(width);
21    this.y = random(height);
22    this.diameter = random(10, 30);
23    this.speed = 1;
24
25    this.move = function() {
26      this.x += random(-this.speed, this.speed);
27      this.y += random(-this.speed, this.speed);
28    };
29
```

Textual

Graphical

Embodied

Developments in HCI

Augmentation Research Center ARC(1963)

Xerox PARCtab

"Gut Technology is invisible"

Mark Weisser

Ubiquitous computing and IOT (1988)

Tangible User Interfaces (1997)

“Tangible Bits: Towards Seamless Interfaces between People, Bits and Atoms”

Embodiment

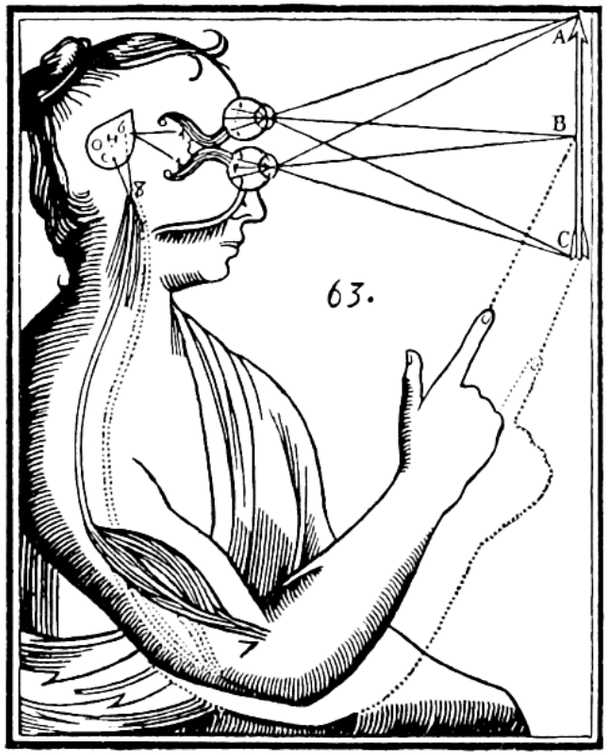
Image: J. van Dijk (2013)

Embodiment Cognition

…brain, body and the environment, and in particular relations between them, are all considered to be part of the cognitive system - part of the mechanism that makes cognition happen

Jelle van Dijk

René Descartes, (1596-1650)



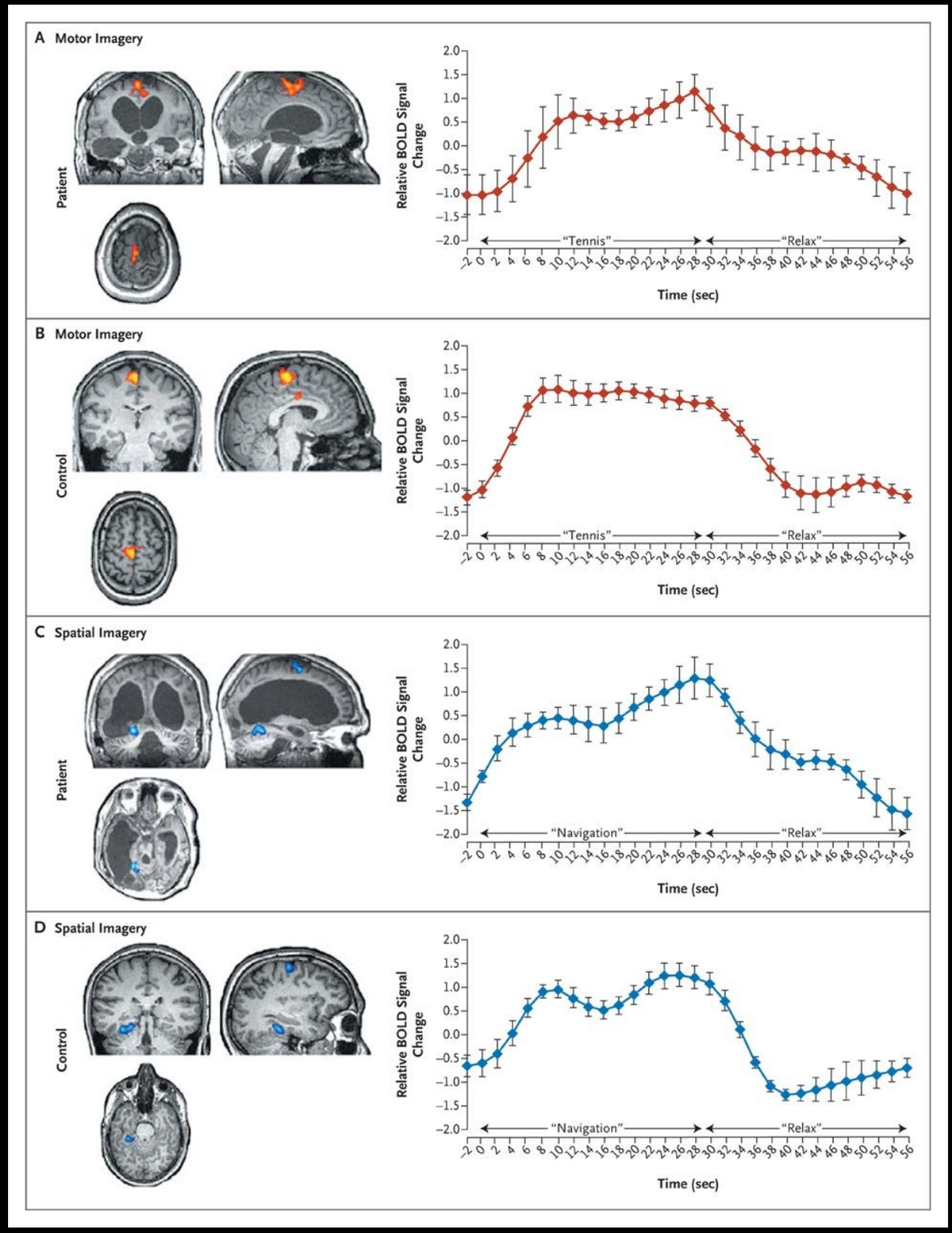
Mind–body dualism

Image: J. van Dijk (2013)

Embodiment

Theory of Embodied Cognition

Willful Modulation of Brain Activity in Disorders of Consciousness, M. Monti, et al. 2010



Brain Computer Interfaces

Embodied Maths