

Preface

In the last decades, several researchers from neurosciences and human and social sciences areas started to be interested in understanding how the human brain works on decision-making. This is actually one of the most interesting and challenging field of investigations in all social sciences. In addition, understanding about brain functioning was declared in the United States a priority concern, and the National Institute of Health (NIH)¹ recommend that this task shall involve multidisciplinary research and studies aiming to investigate human decision-making as much ecological as possible.

Several technologies are used to map the brain activity in humans: positron emission tomography (PET), single-photon emission computerized tomography (SPECT), functional magnetic resonance imaging (fMRI) and electroencephalography (EEG). PET and SPECT require use of positron-emitting molecules (tracer) that restrict their applications in human studies. fMRI and MEG demand high-cost equipment and special facilities that make implementation of ecological studies about human decision-making difficult. In addition, fMRI has a low temporal resolution although providing an excellent spatial discrimination of brain activity. EEG records electrical cortical activity at very speedy rates, but it has been criticized to have low spatial resolution and to be unable to sense subcortical activity. However, recent developments have improved significantly the EEG cortical spatial resolution.

The EEG portability makes its use very easy not only in human-friendly environments, but also in places where professional activities

¹http://web.stanford.edu/class/symsys100/Report_BRAIN2025_AScientificVision.pdf.

Index

A

adequacy, 22
amplitude LORETA sources, 84
amplitude source frequencies, 85
amplitude source mappings, 85
anterior cingulate cortex, 2, 43
anterior insula, 1
attention control, 33, 42
averaged EEG, 86
axon, 27

B

BA, 29
band frequencies, 87
band frequencies mappings, 87
benefit, 35, 40, 48
Brodmann, 29
Brodmann areas, 30

C

cingulated cortex, 1
columns, 32
conflict, 22, 24
converter, 84
cortical columns, 30

D

data encoder, 87
dendrites, 27
dilemma, 7–8
distributed intelligent processing
 system (DIPS), 34, 36, 39
distributed processing device, 32

E

ecological experiment, 74
electroencephalogram (EEG), 55
EEG average, 79
emotional feelings, 18
EPSP, 28
event-related activity (ERA), 63
expected rewards, 32
experienced benefits, 5

F

FA mappings, 88
factor analysis (FA), 65, 78–79
fear of risks, 5
fast Fourier transform (FFT), 85–86
final balance, 62
functional magnetic resonance
 imaging (fMRI), 56
formal grammar, 33
future perspective, 22
future time perspective, 21

G

Gestalt theory, 39
grand average, 80–81

H

$H(e_i)$, 11, 77–78
hubs, 35, 37, 44
human emotions, 5
humor, 23

I

interpersonal decision space (IDS), 22
 interpersonal evaluating systems
 (IES), 6, 10
 identified LORETA source (ILS), 83,
 85, 87
 insula, 4
 intention, 48
 IPSP, 28

L

law, 9, 12
 LDA mappings, 87
 logistic regression, 87
 LORETA, 78, 82–86
 LORETA decoder, 84, 87

M

market's humor, 23
 medial prefrontal cortex, 2
 men, 4
 moral and law, 5
 moral dilemma, 6
 motivation, 17
 multiple linear regression, 79

N

necessity, 17
 negotiation, 3
 neuromodulators, 29, 36
 nucleus accumbens, 1–2

O

orbitofrontal cortex, 2, 4

P

parameters, 84
 personal decision space (PDS), 22
 personal evaluating systems (PES), 6,
 9–10

positron emission tomography (PET),
 55
 pleasure, 5
 portfolio value, 62
 prefrontal cortex, 2
 presynaptic terminals, 36
 prices, 3–4, 21, 23–24

R

reductionist, 39
 reward, 41, 60
 risk, 32, 35, 40–41, 48, 59

S

social, 6, 9
 source band mappings, 87
 single-photon emission computerized
 tomography (SPECT), 55
 spikes, 28
 summary LORETA, 87

T

temporal discounting, 21
 time-varying cross spectra (TVSCR),
 86

U

utilitarian, 7–8

V

value, 40, 48, 59
 ventromedial prefrontal cortex, 41
 vmPFC, 41
 vote decision, 11

W

well-controlled experiment, 73
 willingness, 19, 22–23
 women, 4
 working memory, 33, 41–42