27 Brain science and ICT elucidate the athletic brain

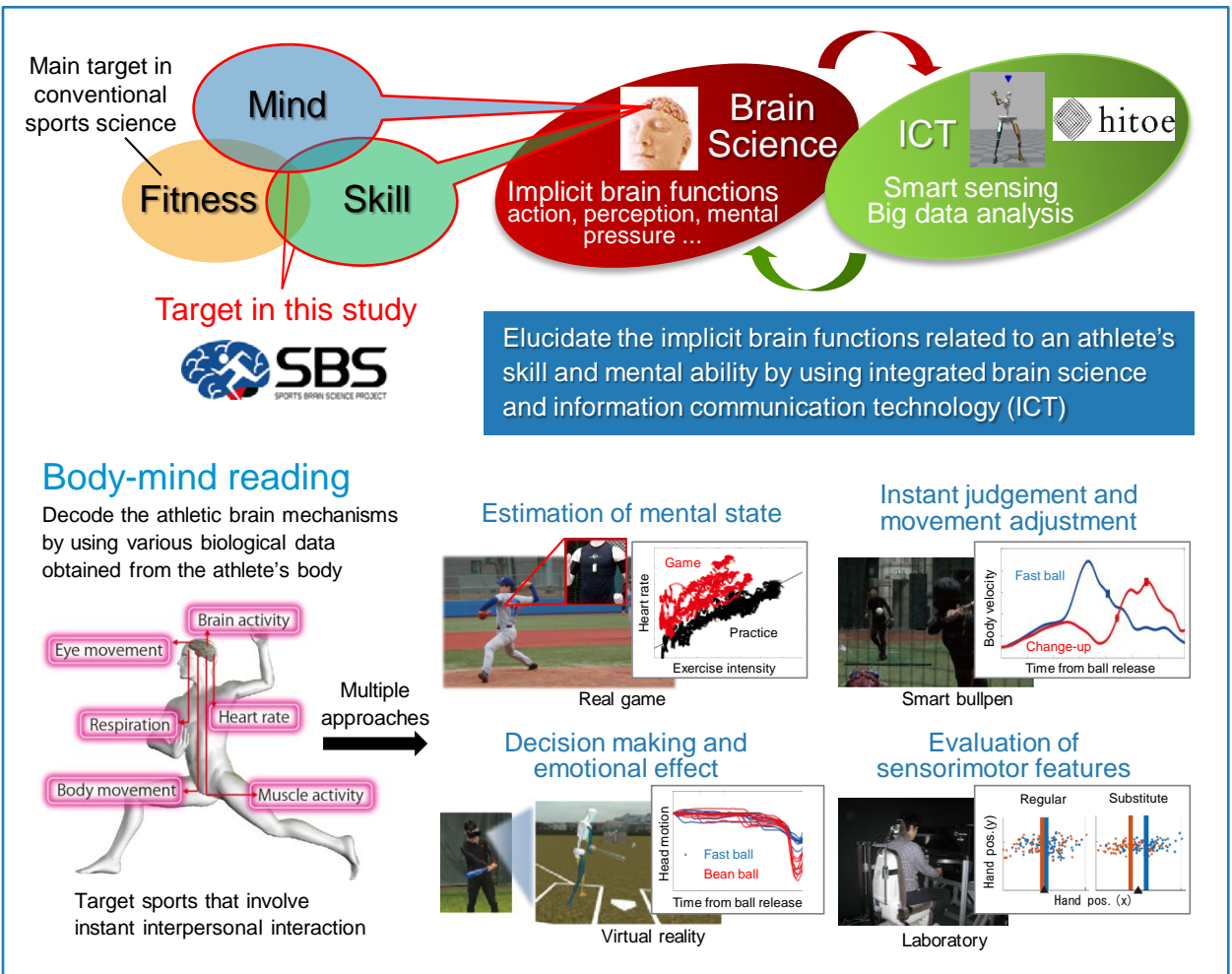## - Sports brain science based on body-mind reading -

Abstract

To win at sports, an athlete requires excellent skill and a strong mind, which are mainly determined by implicit (unconscious) processing in the brain, as well as good fitness. We are working to elucidate the implicit brain functions related to an athlete's skill and mental state in sports that involve an instant interpersonal interaction, such as baseball, by integrating brain science and information communication technology (ICT). We use "body-mind reading" techniques to decode those mechanisms based on various biological data obtained from the athlete's body, and employ multiple research approaches that include realistic field measurements and precisely controlled experiments. Our findings will make it possible to assess athletic ability and level, and also help to improve and enhance an athlete's brain function and performance in combination with intuitive multimodal feedback.

Main target in conventional sports science

Mind

Fitness   Skill

Brain Science
Implicit brain functions
action, perception, mental pressure ...

ICT   hitoe
Smart sensing
Big data analysis

Target in this study

SBS SPORTS BRAIN SCIENCE PROJECT

Elucidate the implicit brain functions related to an athlete's skill and mental ability by using integrated brain science and information communication technology (ICT)

Body-mind reading

Decode the athletic brain mechanisms by using various biological data obtained from the athlete's body

Brain activity
Eye movement
Respiration   Heart rate
Body movement   Muscle activity

Multiple approaches →

Target sports that involve instant interpersonal interaction

Estimation of mental state

Heart rate / Exercise intensity — Game, Practice

Real game

Instant judgement and movement adjustment

Body velocity / Time from ball release — Fast ball, Change-up

Smart bullpen

Decision making and emotional effect

Head motion / Time from ball release — Fast ball, Bean ball

Virtual reality

Evaluation of sensorimotor features

Hand pos. (y) / Hand pos. (x) — Regular, Substitute

Laboratory

Reference

[1] Sports Brain Science Project website, http://sports-brain.ilab.ntt.co.jp/index.html.

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