

Optimal Action in High-Speed Environments

Empirical Approach to the Psychological Regulation of Action of Jet Pilots and Speed Athletes

Author	Gustav Weder PhD Management Consultant Disentis/Mustér, Switzerland
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Introduction

Background

- For 2 years working as a management consultant
- Worked 25+ years in high-speed environments - as a human resources executive in FIN, FMCG and TEC companies
- General fascination for speed environments
- Former Olympian

Research Questions

- How do experts regulate optimal action in high-speed environments?
- What strategies do they use?
- Can these strategies apply beyond?

Objective

Gather detailed subjective theories from experienced experts and reconstruct their internal representations of optimal action

Introduction

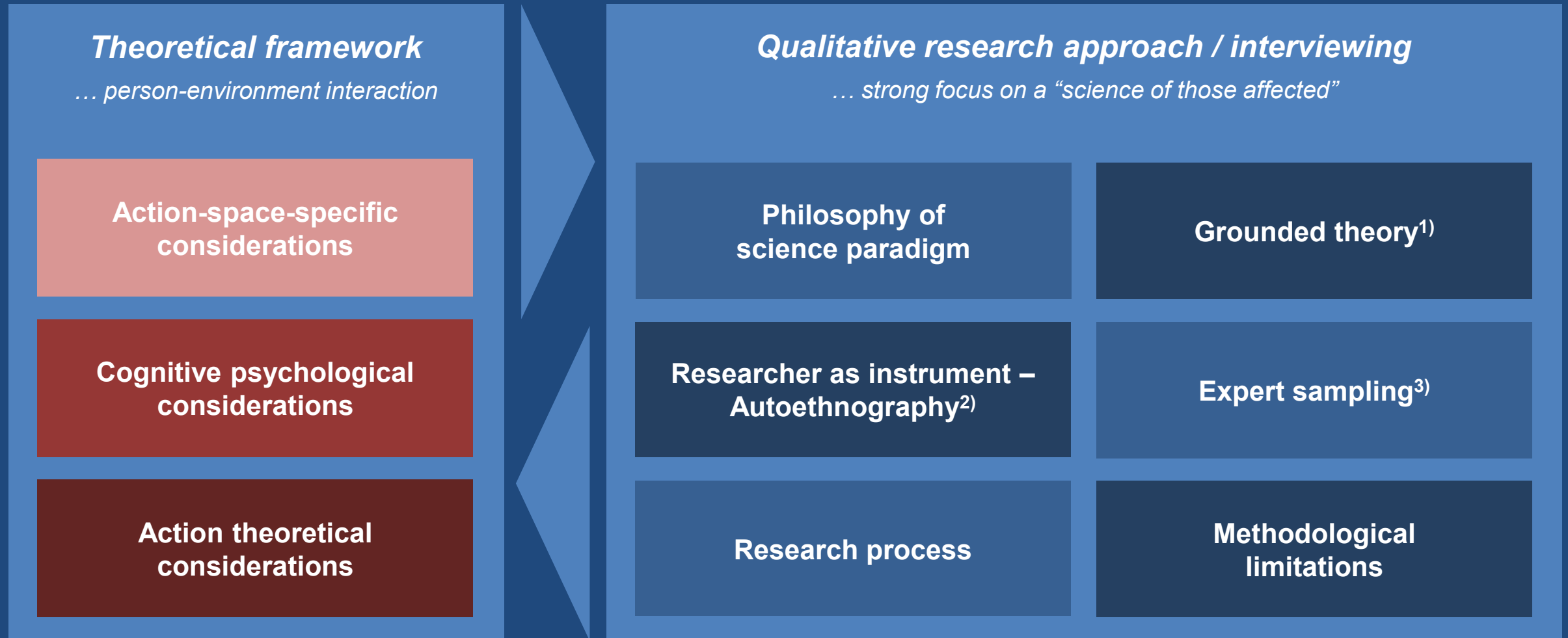
Expert Sample

- 7 aviation pilots (fighter jet and commercial airline), 17 elite athletes (Formula 1, downhill and speed skiing, motorcycle racing, bobsleigh, skeleton)
- **Expert Status:** Aviation: acknowledged by peers as a leading figure or legend in the profession; Sport: sustained top-level success, demonstrated through repeated wins at the highest competitive level over a 10-year period
- **Gender:** 1 F / 23 M
- **Nations:** CH, CAN, GER, IT, GB

- Exemplary micro-worlds allow laboratory-like investigation
- Risk involved provokes seriousness of planning, execution and reflection



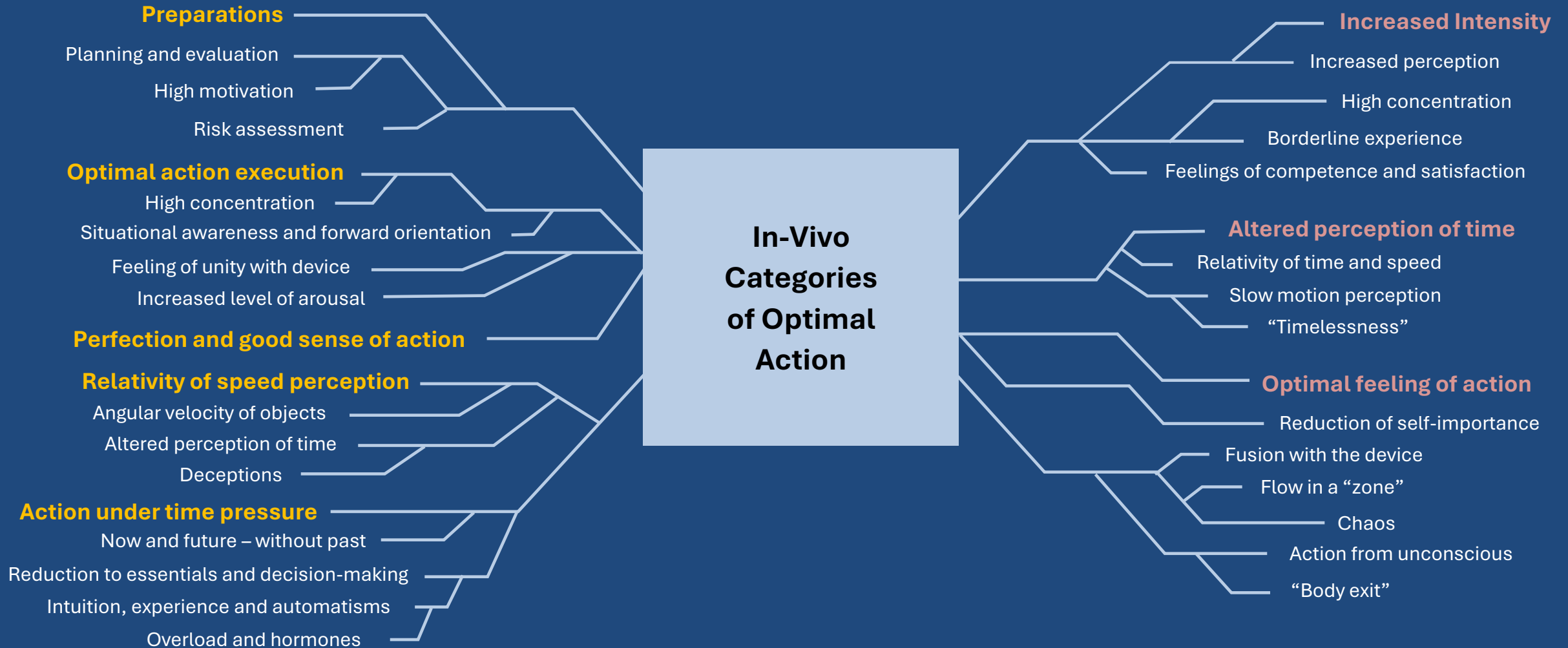
Methods



Sources:

- 1) Grounded Theory: Glaser & Strauss (1967); Strauss & Corbin (1990); Charmaz (2006, 2014)
- 2) Autoethnography: Ellis & Bochner (2000); Adams, Jones & Ellis (2015)
- 3) Expert Sampling: Patton (1990, 2015); Denzin & Lincoln (1994, 2005); Charmaz (2006, 2014)

Results – In-Vivo-Categories of Optimal Action in Aviation and Sport



Results – Text Examples From Interviews

Former military jet pilot / airline pilot ... situational awareness and forward orientation

... Overview ... what kind of information I have, what exactly does the other person (plane) do, where do I have to go ... Then I have an overall view and based on that I can act accordingly. If this is possible, then my plan works, if I don't have this overview anymore, then I have to leave ...

Military jet pilot ... reduction to essentials and decision making

... At high-speed low over ground, the bucket is already very full in terms of processing capabilities ... It's very environment-dependent ... But it's a primary task ... You just must see that you get the level in the bucket back down there that nothing overflows ...

Military jet pilot ... intuition, experience and automatisms

... Then comes intuition, which tells you how to react correctly ... So, in air combat, a lot is still intuitive ... It is experience you gain through endless training ...

Formula 1 car driver ... optimal feeling of action

... It is about trying to get the harmony with the car, trying to be one with the car ... It's the car and me as one ... We are one ... that is your task ... The best feeling you have is to be part of the car ...

Speed skier ... slow-motion perception

... It then becomes like "slow motion" ... In reality, you are speeding up, but by perceiving only every second or third frame, the eye feels like it's going slower ... I still enjoy it. It's that feeling ...

Speed skier ... action from unconscious

... It's harmony, it's rhythm, it's sensational in terms of feeling ... simply a state where everything comes together... I don't think that one still thinks then ... that would actually prevent it ... it's about letting go of all barriers in these situations ... the subconscious is what has to control that, actually learned and approached ...

Results – Empirically Derived Categories Foster the Following Hypothesis

1

**Triadic
action circle**

**Anticipation
Realization
Interpretation**

2

Huge time pressure

**High attention and
concentration**

**Information reduction to
the essentials**

3

**High competence beliefs
and motivation**

Optimal visualization

4

**Synchrony of
psychological reality
with physical reality**

5

**Emotional valuation
has core
action-regulatory
function**

6

**Reproduction through
delegation to
automatisms**

7

**Accelerated cognitive
processes**

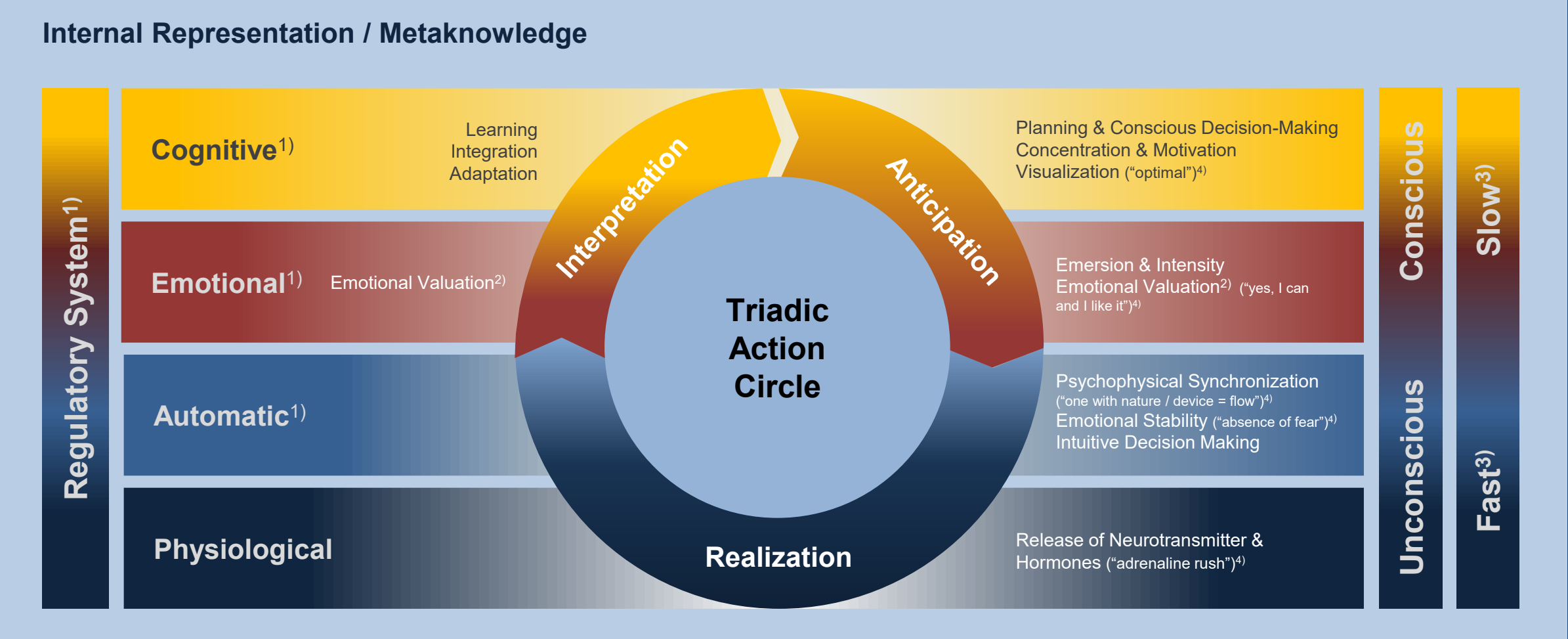
**Release of
neurotransmitters and
hormones**

8

**Overloaded information
processing**

**Borderline experiences
force physiological
adaptations**

Results – Hypothetical Integrative Psychological Model of Optimal Action



Sources: 1) Regulatory Systems: Piaget (1967); Nitsch & Munzert (1997); Nitsch (2004)
2) Emotional Valuation: Goleman (1994, 2024)
3) Thinking Fast and Slow: Kahnemann (2011)

Notes: (4) "..." = In-vivo categories mentioned by experts

Recommendations regarding optimal action in high-speed environments

1

Pattern recognition

Radically filter for
critical information

2

Feedforward

Mentally visualize, anticipate
and pre-structure

3

Trustful feeling

Central importance of
emotional valuation

4

Intuition and automatisms

Deliberately practice to
embrace and cultivate

5

Post-action debrief

Adaptation and
continuous learning

6

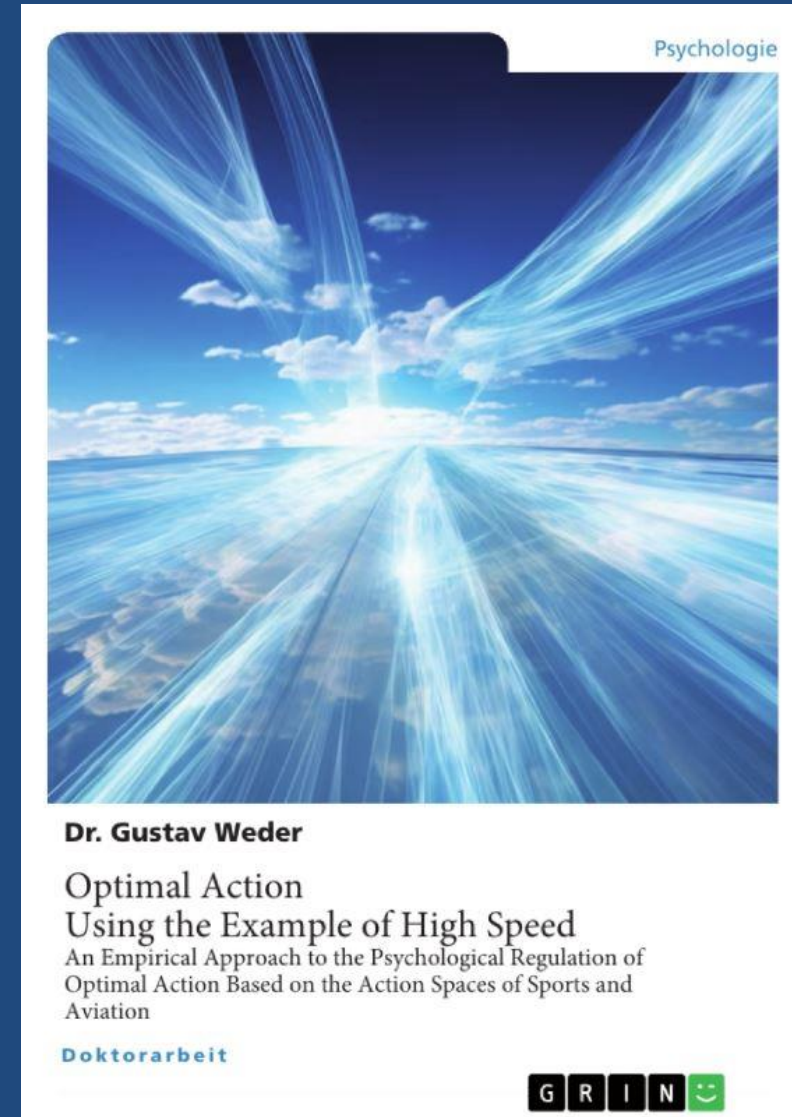
Full recovery

Enhance systemic support
for human limits

More details

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Contact

Gustav Weder PhD
Management Consultant

gustav.weder@bluewin.ch
+41 79 790 60 50

Via Acletta 31
7180 Disentis/Mustér
Switzerland