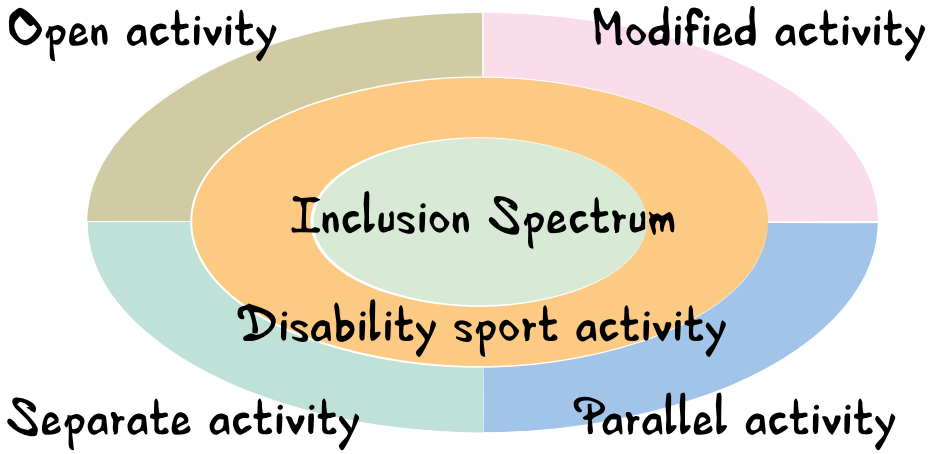
Disability Sport & Inclusion

Considering inclusion, diversity values, and accessibility is often part of designing sports technologies. Inclusion is key to create a society that values diversity and promotes equal opportunities for all individuals, regardless of their abilities.

For Paralympic, the Olympics for athletes with impairments, a contentious controversy is determining who qualifies as a Paralympic athlete and how to classify disabilities for the competition. Can functional classification be used to group athletes with different disabilities but similar ability levels, or can disability-specific classification be used to group athletes with similar disabilities despite different capabilities? Also, the debate continues whether disabled athletes who use prosthetic limbs should be allowed to compete in able-bodied sports.

For inclusive physical activity, the aim is to develop new teaching/training methods to merge the different approaches for high-level, normal, and disabled athletes. This will help to create an inclusive environment that supports the development of skills for all athletes, placing everyone on the same level playingfield.



Disability Sport & Inclusion

A challenge is designing physical activities to include physical and cognitive impairments. Inform your design by considering functional impairments and specific disabilities; modifying the activity or creating parallel, coordinated activities that include a range of impairments is often possible.

Questions and Proposals

- Identify your inclusion range: Consider diverse impairments (e.g. visual, motor, or cognitive impairments) and how they affect participation and performance in your envisioned activity and set your inclusion goals.
- Consider how disabilities (e.g., leg paralysis) create impairments and capabilities (e.g., arm strength). Based on such abilities, re-imagine your design—proposed methods: Empathy in Action, Digital Twin Sensitising in VR.
- Consider including everyone, including people with impairment and engage your target groups—proposed methods: Empathy in Action.

Modifiers

- Basic Movement, Training Element, Impairment, Logics, Stances, & Values, Game Structure.

Philosophy of Sports and Movement

1 Movement Concept

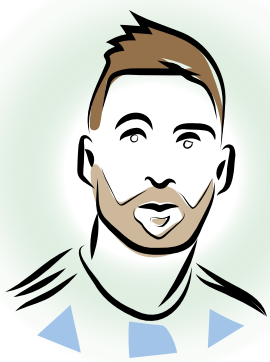
Apollonian and Dionysian

Friedrich Nietzsche originally formulated these concepts. Apollonian represents rationality, order, harmony, and form, while Dionysian represents emotion, chaos, irrationality, and passion.

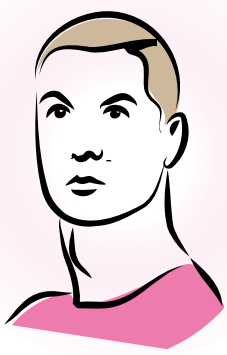
According to Nietzsche, the tension between these two forces is necessary for creating great art and developing human culture.

Apollonian aspects of sport include technique, strategy, and precision, whereas the Dionysian side is represented by passion, emotion, and spontaneity. Apollonian values include discipline, structure, and order in pursuing success. Dionysian values include creativity, instinct, and freedom in pursuing excellence.

The Apollonian and Dionysian perspectives help us consider the balance between structure and spontaneity, control and creativity, and mind and body in movement practices. It provides a critical perspective on the business side of the sport, where the focus on metrics, data, and strategy embodies the Apollonian aspect. In contrast, fan culture emphasises Dionysian aspects such as emotion and identity.



Dionysiac



Apollonian

Apollonian and Dionysian

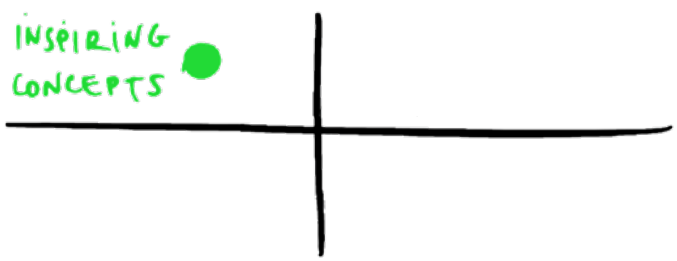
Do you struggle with spontaneity vs structure or control vs freedom in your design solution? Understanding the tension in the concepts of Apollonian and Dionysian will inspire your movement design balancing such dilemmas.

Questions and Proposals

- Pick opposite values from the Apollonian / Dionysian perspectives. Try to generate ideas by acting out movements informed by these two values and vary your design with these as your goals.
- Select a combination of design methods to create a balance between structure and chaos, freedom, constraint etc., in the movement design process.
- Analyse how your movement test data balances Apollonian values like progress and achievement vs Dionysian values like spontaneity and passion.

Modifiers

- Play & Sports Discipline, Role & Perspective Persona, Play Element, Play Perspective, Logics, Stances, & Values, Game Mechanics.



Philosophy of Sports and Movement

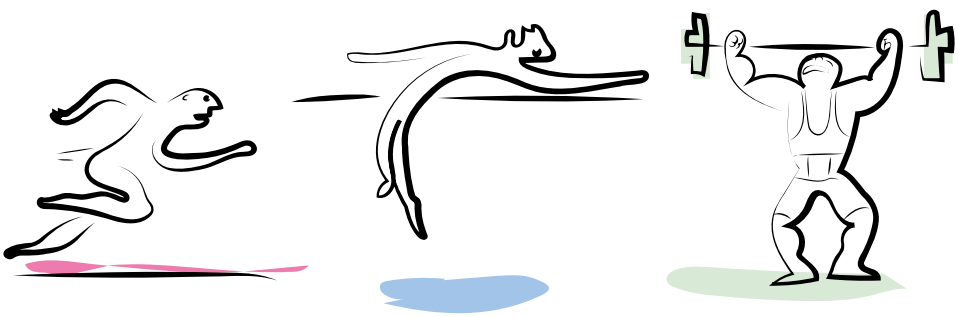
The Performance Enhancement Ideals

The extensive use of sports technology and data mirrors some of the Olympic ideals of performance enhancement. It is although worth remembering to embody the other Olympic values in sports design. In 1894 the Frenchman Pierre Coubertin initiated The Modern Olympics, a sporting event that involves participants from all over the world competing in various sports. The Olympic ideal is encapsulated in the motto "Citius, Altius, Fortius" (faster, higher, stronger), and in 2021 "Together", which motivates athletes to give all in competition. The athlete, who demonstrates superior speed, jumping ability, and strength compared to other competitors, embodies this ideal.

It can be contrasted with the Olympic maxim, which states that The most crucial thing in the Olympic Games is not to win but to take part, just as the most vital thing in life is not the triumph but the struggle. The essential thing is not to have conquered but to have fought well.

These two principles represent an ideal that Coubertin advocated as a vital life lesson derived from participating in sports and the Olympics.

Citius, Altius, Fortius



The Performance Enhancement Ideals

What design goals are suitable when designing sports equipment? The Olympic ideals towards becoming "faster, higher, stronger" (citius, altius, fortius) can guide this, as well as the Olympic maxim: taking part is more important than winning.

Questions and Proposals

- Identify what your design intends to accomplish. Intend your design to challenge athletes to become faster, higher, or stronger. Or challenge other aspects of physical performance? Vary your design to try to include other aspects. Proposed methods: Mock-ups for Movement Design, Build & Describe.
- Consider how the design emphasises the Olympic ideal of making participation more important than winning. How can you vary the design to encourage fun and engagement? Proposed methods: Object Theatre, Strong Prototyping.

Modifiers

- Movement Perspective, Training Element, Play & Sports Discipline, Play Element, Logics, Stances, & Values, Constrain, Technology.

Philosophy of Sports and Movement

The Aesthetics of Movement

Aesthetics is the study of beauty and what we think is beautiful. Aesthetics of movement looks at how we feel about movement and what it can tell us. Aesthetics of movement considers how we perceive, interpret, and evaluate movement, and how movement can express emotions, ideas, and cultural meanings.

Movement can be evaluated based on its technical execution, its artistic expression, and its ability to communicate meaning to the viewer or participant. Aesthetics of movement can be applied to a wide range of activities, including dance, sports, martial arts, and everyday movement.

An additional research topic on the aesthetics of sports deals with the debate of whether sports are art.

The aesthetics of movements includes aesthetics kinds of sports as figure skating, ice dancing, rhythmic gymnastics etc. People can have different opinions about what's beautiful, since it depends on their culture and personal preferences.

The Aesthetics of Movement

How can we design to emphasise the beauty in movement? You may consider how we perceive the aesthetics of movement and how movement can express emotions, ideas, and cultural meanings. Many sports practices have set aesthetics, but we can also guide the design to allow participants to explore and develop their sense of aesthetics.

Generating Questions or Proposals

- Move according to your design idea to experience it first-hand. Does it give your new aesthetic experiences? Proposed methods to varied and experience: Slow storming, Embodied Storming, Context Playing.
- Can you vary your design idea based on technical execution, artistic expression, and communicating meanings and change using supporting (existing or envisioned) technologies? Proposed Methods: Explore Movement, Slow Storming, Embodied Sketching.

Modifiers

- Movement Perspective, Training Element, Play & Sports Discipline, Metaphor, Persona, Play Perspective, Logics, Stances, & Values.

Philosophy of Sports and Movement

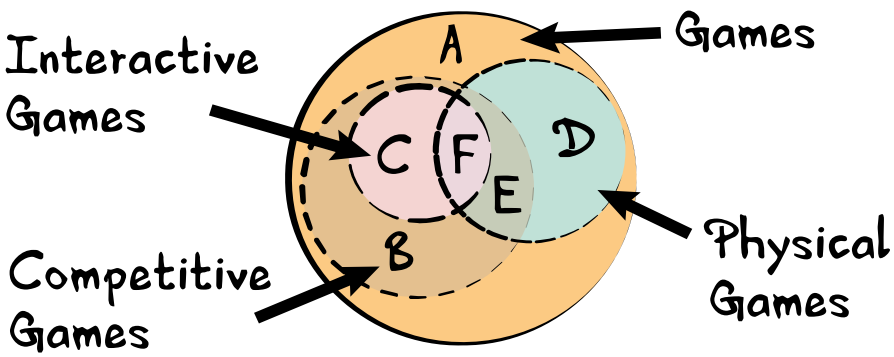
Games and Sports

Vossen's framework on games and sport has been widely influential in classifying different games and sports based on three dimensions: physicality, interactivity, and competitiveness.

Physicality
Physicallity is about the need for physical involvement in an activity. Activities for which motor competence is essential to goal attainment are considered physical (e.g. soccer). Higher levels of motor competence typically lead to more effective means of goal attainment. Activities for which motor competence is not a prerequisite for goal attainment are non-physical. Chess is nonphysical - other players can move your pieces.

Interactivity
Interactive activities involve offence and defence, and non-interactive activities do not. Javelin throw is non-interactive - there is no way to play offence or defence. Basketball is interactive - offence and defence are key to the nature of the game.

Competitiveness
Competitive activities involve opponents; non-competitive activities do not. Solitaire is played by oneself and is thereby non-competitive while sprint running is performed in the presence of competing athletes and is thereby competitive.



Games and Sports

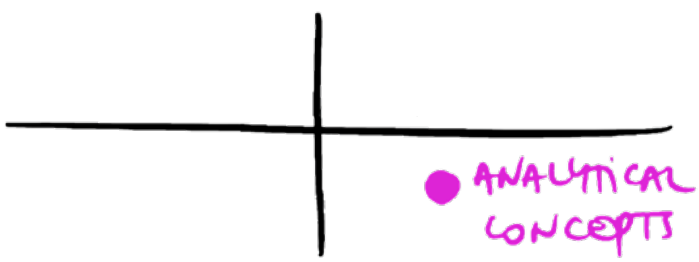
Are you designing game or sports activity or both? Consider similarities and differences. Most sports are physical, while many games are not. Reflecting on the nature of your activity can help you improve your designs. We recommend Vossen's framework on games & sports (physicality, interactivity, competitivity) to aid your reflection.

Questions and Proposals

- Consider how physical, interactive, and competitive your activity will be. If you change them, how will they change the nature of the activity? Proposed methods: Generate Games from Play, Embodied Sketching.
- Analyse your target audience. Will they be more interested in playing games or participating in sports? How do varying physicality, interactivity, and competitiveness affect who will participate? Proposed methods: Roleplaying, Build & Describe, Forum Theatre.

Modifiers

- Play & Sports Discipline, Play Element, Play Perspective, Logic, Stance & Value, Technology, Game Structure, Game Mechanic.



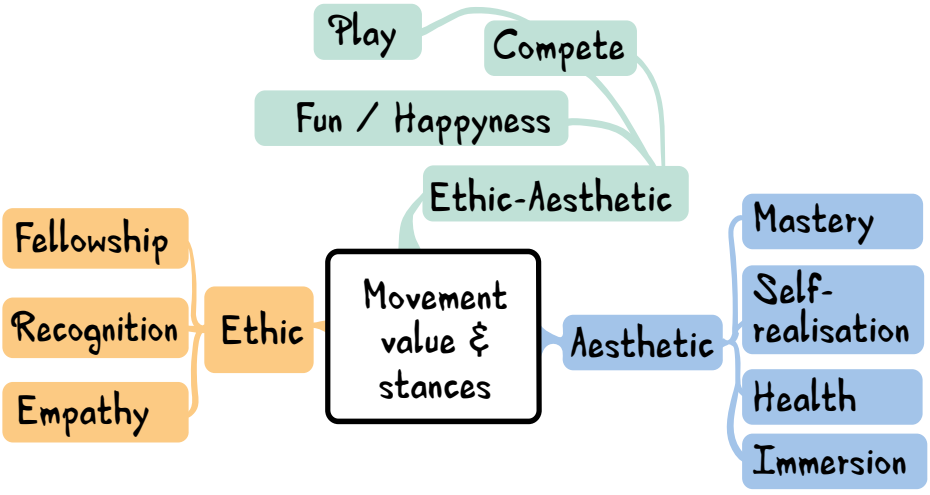
Philosophy of Sports and Movement

5 Movement Concept

Movement Values

Designers tend to meet and understand users as social and emotive moving humans. Thus designing for sports, we believe considering value stances will inform understanding of the design of sustainable movement-centric experiences. According to the philosopher Søren Kierkegaard, human existence has three stages: the aesthetic, the ethical, and the religious. The aesthetic dimension denotes that humans aspirate to have a life with pleasurable experiences in which the human being does not extend beyond the self. The ethical dimension refers to the human endeavour to do well about specific normative standards of social co-existence. Kierkegaard argues that an equilibrium between aesthetics and ethics in personality building is worth striving for.

Uncovering these virtues, values, logics, or lenses provide a basis for understanding how aesthetics and ethics shape the interplay between the personal and the interpersonal dimensions in sports and other movement-centric domains. From various sources, we have mapped out commonalities in values and their interrelations (see the illustration). For sports, we leave out the religious area.



Movement Values

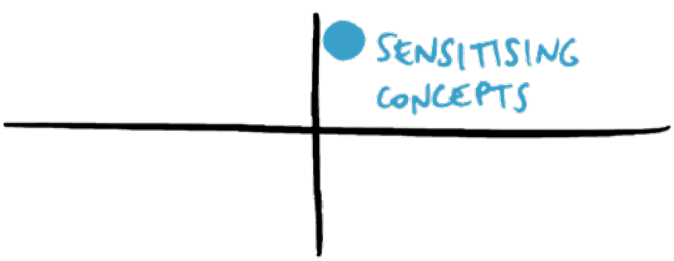
What values motivate your design? Is it, e.g., motivated by creating social connectedness or performing well according to some norm? Sensitising your solution by mapping out the possible virtues and values that underlie your design will help you understand how it will influence participants' personal attitudes and interpersonal relations.

Questions and Proposals

- Move to generate ideas based on possible value stances. Consider varying between aesthetic (e.g., mastery, self-realisation, health), ethic (e.g., fellowship, empathy), and ethic-aesthetic (e.g., play, competition, fun) value stances. Methods: Explore Movement.
- Try selected ideas with groups of participants. How do the values influence the group's personal attitudes and interpersonal relations? Is there a reason to change some of the values? Methods: Roleplaying, Movement-Scenario.

Modifiers

- Play & Sports Discipline, Play Element, Play Perspective Logics, Stances, & Values, Game Mechanics, Role & Perspective, Persona.

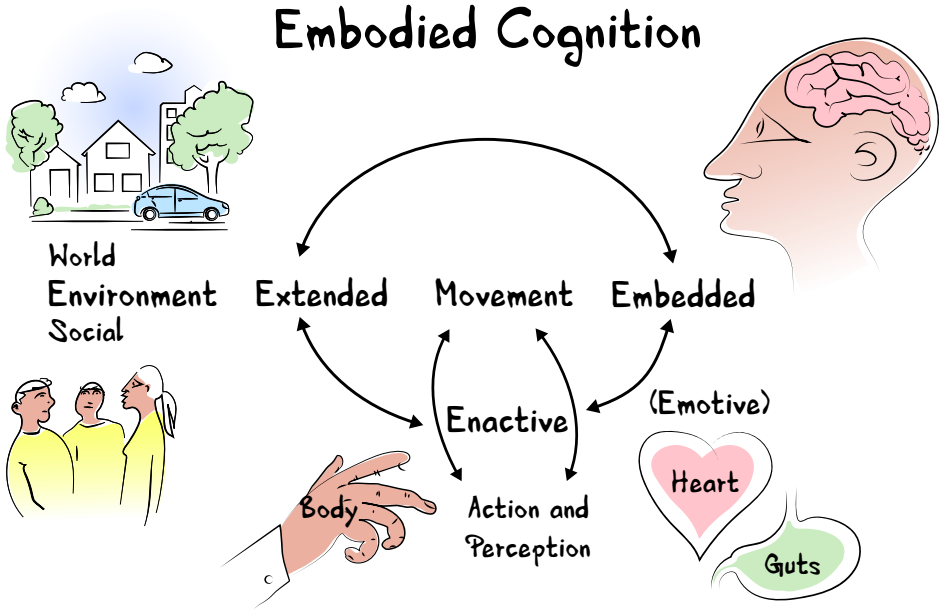


Philosophy of Sports and Movement

Embodied Cognition

The theory of embodied cognition (EC) posits that physical movement is crucial in shaping our perception, action, and cognition. Our bodies play a vital role in shaping our experiences and understanding of the world. Rather than viewing cognition as a mental representation of reality, EC views it as a result of the interaction between the body and the environment. EC is a fundamental theory in designing for, of, and with movement, using movement as a creative resource.

Physical movement and engagement with our bodies can influence and alter our experiences, leading to new possibilities in perception, action, and cognition. EC incorporates embodied (body-based), embedded (social environment), extended (physical environment), enactive (emerging from interaction), and emotive (influence of emotion on cognition) aspects of cognition. Movement as action is a significant element in enactment, thus being iteratively interrelated with perception.



Embodied Cognition

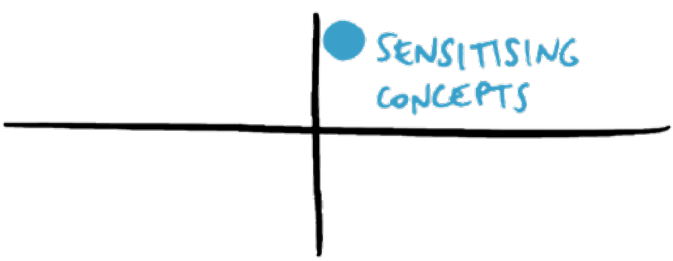
Have you ever thought about how your senses and actions with the world form your perception? How is your cognition a relationship between your body and the environment? You can sensitise your users and context by mapping out your solution's embodied cognitive relations.

Questions and Proposals

- The methods Sensing Through Objects, Empathy in Action, and Embodied Sketching methods help us empathise through sensing. Generate movement ideas by acting out embodied aspects of an activity, focusing on the extended, embedded, enactive or emotive action.
- Which emotions do you experience or are most visible in your movement concept?
- Observe your users' test experiences or behaviour from an enactive perspective.

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline, Play Element, Persona, Technology, Logic, Stance & Value, Role & Perspective.



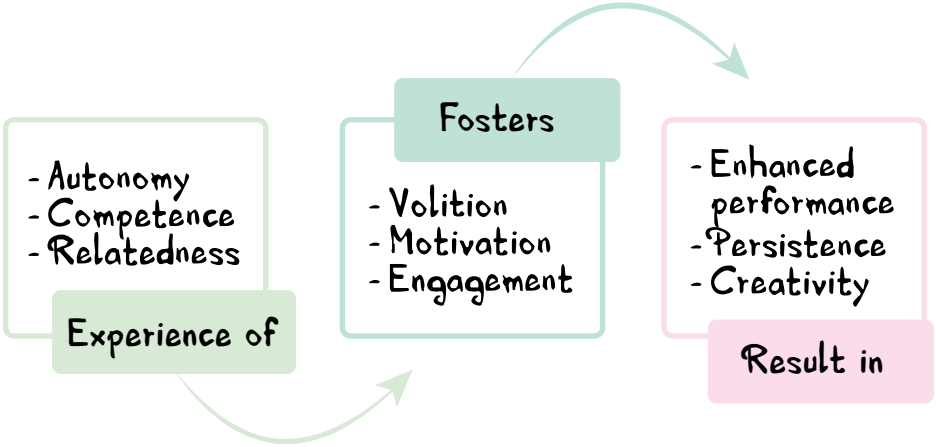
Understanding Psychology of Humans

Self Determination Theory

Motivation is the force that drives us to take action and can be classified into intrinsic, extrinsic, and amotivation. Extrinsic motivation (EM) comes from bonuses or game scores. EM is seen in the external regulation, introjection, identification, and integration continuum. Intrinsic motivation originates within an individual and is driven by fulfilling basic psychological needs such as:

- the need to feel competence
- the need to feel social connectedness
- the sense of autonomy, which makes us like activities we are good at or the craving stimuli that manifest curiosity.

Theories of intrinsic motivation explain autotelic behaviour, which can lead to high levels of motivation and is crucial for exercise adherence. Enjoyment in games and exercise correlates with intrinsic motivation measures based on need satisfaction. Physical activity enjoyment is a positive affective response, and a high degree of intrinsic motivation can be equated with being "motivating and enjoyable." Understanding basic psychological needs provides practical ways to analyse design impacts on motivation.



Self Determination Theory

Consider guiding your movement design by balancing between your intrinsic and extrinsic motivation. What do you focus on in your design? Autonomy, competence and relatedness?

Questions and Proposals

- Sensitise moving along with your athlete/ end-user and feel how you may be extrinsic vs an intrinsically motivated perspective motivated. Methods: Empathy in Action, Sensitising Designers.
- Role-play various scenarios doing movement that satisfy the need for either or autonomy, relatedness and competence. Methods: Generate Games from Play, Roleplaying.
- Analyse your data testing your solution for intrinsic/extrinsic motivation. Methods: Context Playing, Mockups for Movement Design, Video or Photo Sketch.

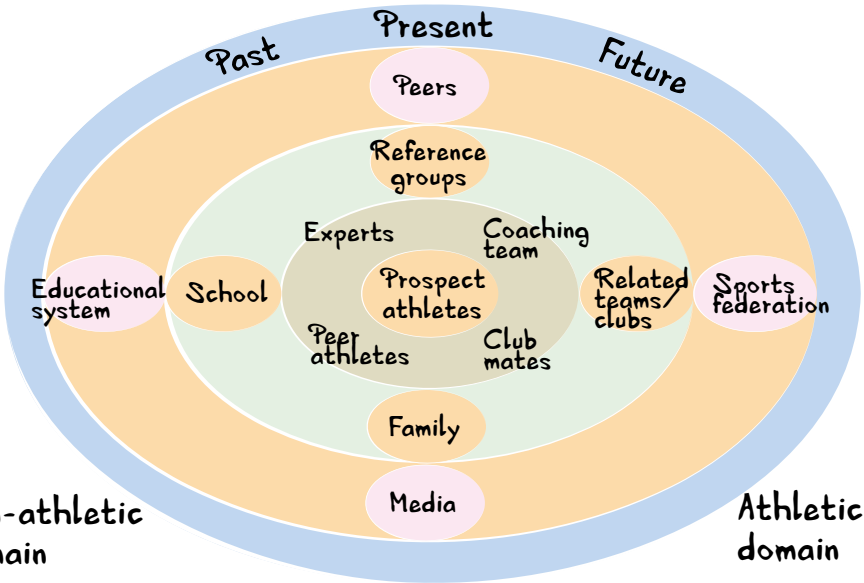
Modifiers

- Movement Perspective, Logic, Stance & Value, Role & Perspective, Game Genre, Play Elements, Play Perspective, Persona, Environment.

Understanding Psychology of Humans

Ecological Model of Talent Development

The holistic ecological approach to talent development changes the focus from the individual athlete to the environment in which they develop, acknowledging the broader developmental context in which pre-elite athletes find themselves. From this aspiring perspective, an "athletic talent development environment" (ATDE) is defined as a young athlete's social relations inside and outside the world of sport - such as social relations which have a sports club or team as their core but also include the sports domain in which the club or team is embedded. The ATDE model is a framework for describing a particular ATDE. The young elite athletes are centred in the model, and the components of the ATDE are structured into micro- and macro-levels and the athletic and non-athletic domains, complemented by the past, present and future. In successful ATDEs, there is dialogue and integrated efforts among all the components. The ATDE model provides a framework when designing for performance, talent development, and sports technology.



Ecological Model of Talent Development

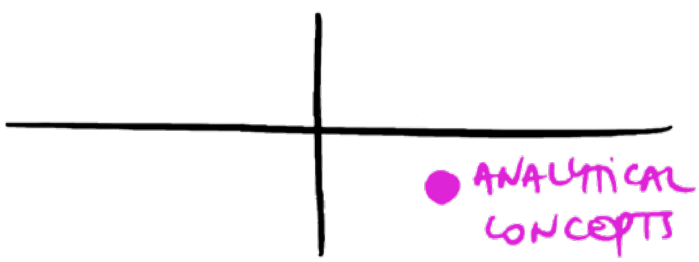
How can you analyse the complex structure likely to create tomorrow's elite athlete? You may use the holistic talent development model to frame your sports talent development technology service.

Questions and Proposals

- To sensitise the athlete by acting out movements with the athlete in arenas of the family, school, club, and the arenas for your solution. Methods: Daily Movements, Roleplaying.
- Ideate by acting out the coach's perspective on how the athlete perceives the daily movement for various supportive solutions. Methods: Context Bodystorm, Generate Movement from Imagery.
- How does the athlete experience your movement solution to support the need for consistency in the environment's daily life? Methods: Strong Prototyping, Movement-Scenario.

Modifiers

- Play Element, Metaphor, Logic, Stance & Value, Role & Perspective, Persona, Environment, Constrain, Technology, Game Structure.



Understanding Psychology of Humans

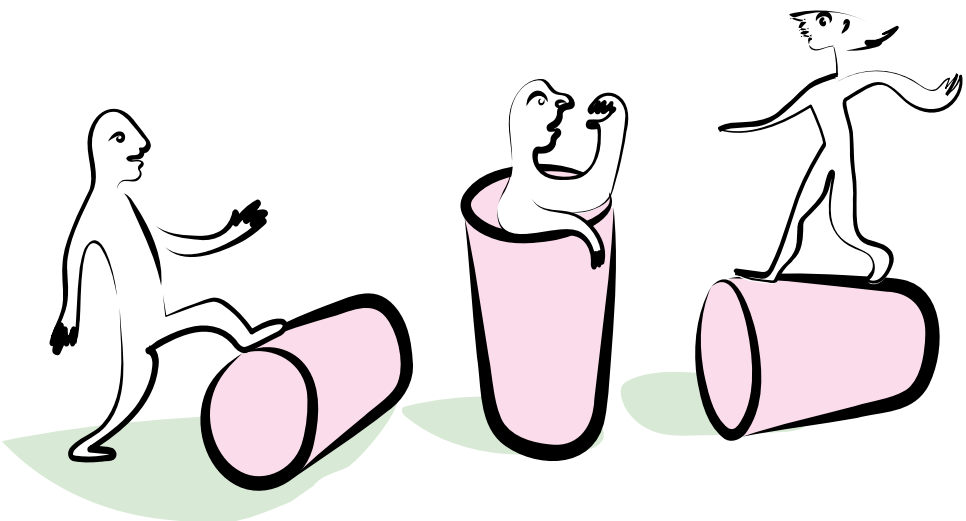
Affordances

Ecological psychology considers even perception to be a form of action and studies how every action develops in close relation to the environment in which it takes place.

The ecological psychology (EP) theory focuses on the relationship between the perceiving agent and its environment, which integrates these as affordances. These are possible actions an object or an environment offers in relation to an actor's capabilities. The action possibilities in a situation depend on the interplay between the bodily characteristics of the agent and the environment in which they are situated. It refers to the objects' properties that show users possible actions. Integrating the EP perspective has been proposed as a design consideration.

When designing an object, an interface, or an activity, it is essential to consider what affordances exist, which ones to create, and how to communicate them to actors.

This helps designers to understand that every user, environment, and interaction is unique.



Affordances

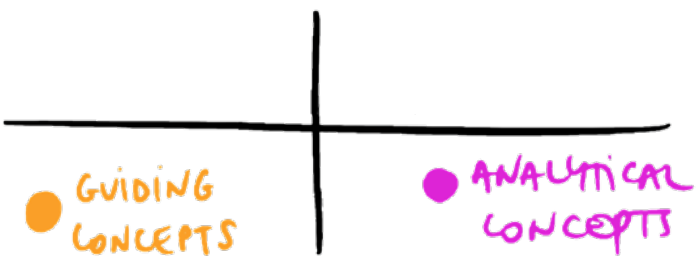
How do interactions come to be? The concept of affordances grounded in ecological psychology may inform your design. Affordances are action possibilities and they are a dynamic interplay between the capabilities of a user and their environment.

Questions and Proposals

- Improvise movement ideas or "embodiate as we propose doing movement ideation" informed by the affordance of the physicality of the environment your sports and movement solution targets. Method: Context Playing.
- Try out Context Bodystorming to create enriching affordances in the design process.
- Observe your user's application of the solutions and analyse how your movement test data establishes affordances-user insights into your solution. Method: Roleplaing.

Modifiers

- Basic Movement, Play Perspective, Environment, Impairment, Constrain, Logic, Stance & Value, Game Genre, Technology, Game Structure, Game Genre, Game Mechanics.



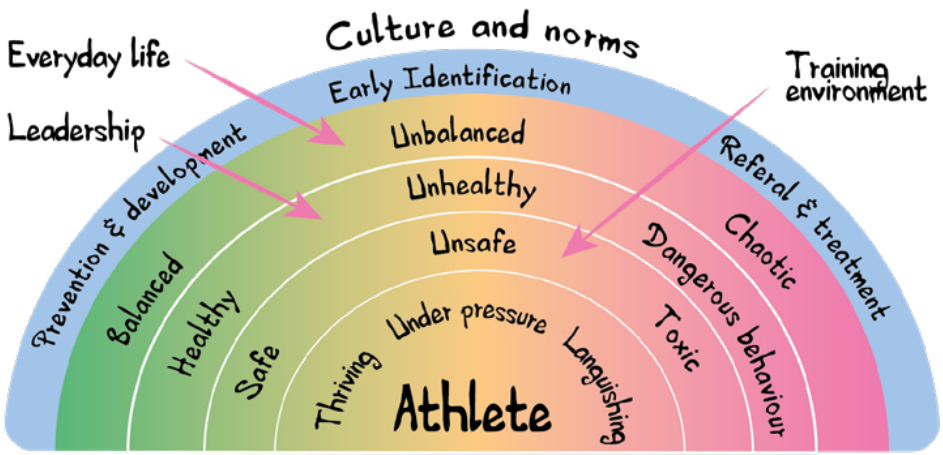
Understanding Psychology of Humans

Mental Health in Sports

The field of sports technology and social design is increasingly aware to address mental health aspects for professional high-performance athletes.

Athletes' mental health is a complex and multi-faceted issue influenced by a range of factors. The mental health challenges athletes face include stigma and social pressures that discourage their expression of vulnerability and probability to seek help. Risk factors for mental health issues in athletes include injury, overtraining, and the transition out of the sport. One of the most significant factors for an athletes mental health is the athlete's sport environment, including the team's culture, coaching style, and level of competition. This environment can impact the athlete's self-esteem, confidence, and well-being. Other essential factors include the athlete's coping skills, resilience, and personality traits.

Several strategies address the mental health needs of athletes in sports, including providing access to mental health resources and services, promoting a culture of openness and support, and educating coaches and other stakeholders about the importance of mental health.



Mental Health in Sports

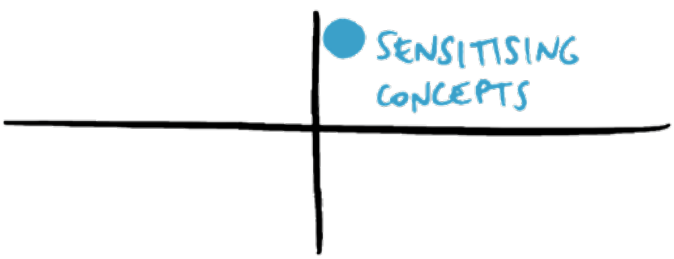
Have you sought the state of art knowledge to sensitise yourself to mental health? Mental health is gaining increased interest among sports psychologists and technology designers who like to apply the newest knowledge in designing sports services for mental health promotion.

Questions and Proposals

- Try to sensitise athlete's overtraining and injury risk factors and pressure/expectations related to mental health. Methods: Sensitising Designers, Empathy in Action.
- Act out movement practice for your solution, providing resources for athletes' coping skills, resilience, self-esteem, confidence, well-being, and personality traits. Methods: Generate Movement from Imagery.
- How does your solution's user experience fulfil user needs for mental health support? Methods: Context Playing, Movement-Scenario.

Modifiers

- Training Element, Play & Sports Discipline, Logic, Stance & Value, Role & Perspective.



Understanding Psychology of Humans

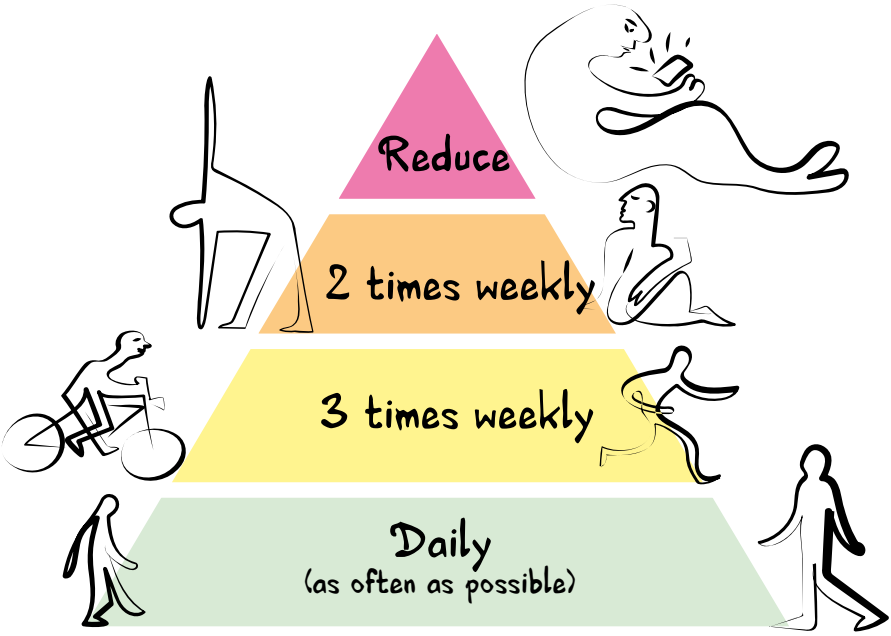
Physical Activity and Quality of Life

Regular physical activity and exercise promote good health and longevity and improve quality of life. Quality of life (QOL) encompasses several factors that contribute to the sense of well-being, including happiness, satisfaction, togetherness, utilizing personal strengths, experiencing interest, mastery, and commitment. Exercise can positively impact all these factors and enhance one's QOL.

Physical activity has been shown to impact QOL positively, and the benefits are subjective and contextualized, meaning they may vary among individuals and settings.

For instance, research has shown that youth who engage in sports and physical activity have higher enjoyment and satisfaction with their lives than their inactive counterparts.

With this understanding physical activity is not only an instrumental goal for health but has an intrinsic value for people's life.



Physical Activity and Quality of Life

Can physical activity and exercise enhance the quality of life? Are you having trouble finding the genuine worth of your design goals? Consider Quality of Life as a helpful guide.

Questions and Proposals

- Empathise with your end-users via movement sensitising in their context. Methods: Sensing Through Object, Empathy in Action.
- Let the concept of QOL guide you in the movement-ideate session. Methods: Bodystorming, Generate Movement from Imagery.
- Analyse your end-user data regarding QOL and ask them to play out different scenarios using your solution. Methods: Context Playing, Strong Prototyping.
- Use QOL to measure a solution's short, medium or long-term effects once it is in use. Methods: SOPLAY.

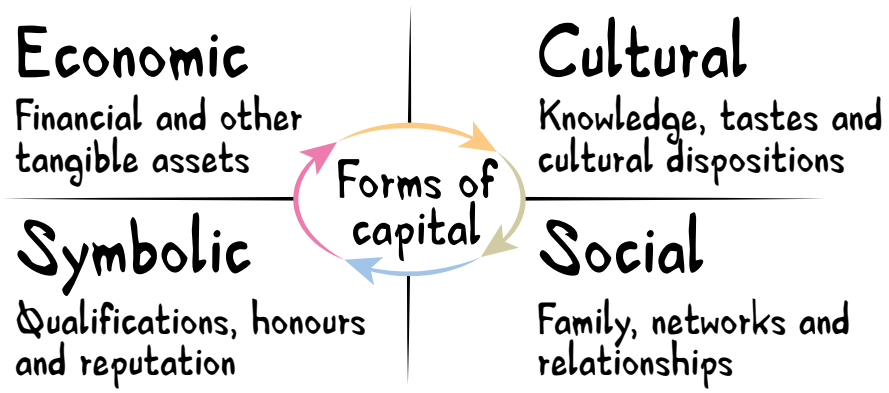
Modifiers

- Basic Movement, Training Element, Play & Sports Discipline, Play Element, Play Perspective, Logic, Stance & Value, Role & Perspective, Persona, Constrain, Technology.

Understanding Humans in Society

Types of Capital in Sports

Pierre Bourdieu developed the concept of capital to describe the different types of resources that exist in society and their impact on social and economic life. Capital refers to any asset used to obtain advantages, achieve goals, or access valuable resources. Bourdieu identified economic, social, symbolic and cultural capital. Economic Capital refers to financial resources, such as wealth, income, and property. Social Capital refers to the resources and connections gained through social networks. Symbolic capital relates to status, honours and recognition considered valuable in a social context. Cultural capital refers to people's knowledge, skills, and cultural background, including education, language, and familiarity with cultural values. In the context of movement and sports, these different types of capital can affect an individual's opportunities and experiences within these fields. For example, economic capital may affect access to training or equipment; social capital may influence team selection or networking, and cultural capital may influence participation and enjoyment. Understanding these different types of capital can help identify and address inequities in movement and sports to promote more inclusive and diverse participation.



Types of Capital in Sports

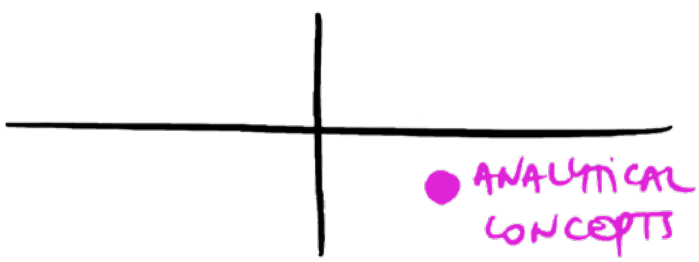
Did you know that understanding Bourdieu's concept of capital can assist you in creating more inclusive designs? Capital may also help you with diverse designs that promote equal access to valuable resources.

Questions and Proposals

- Make movements with your end-users to sensitise how they experience economic, symbolic, social, and cultural capital. Methods: Empathy in Action, Daily Movements.
- Try to movement ideate that compass Bourdieu's economic, symbolic, social, and cultural capital and create ideas that address inequities in the sports. Method: Generate Games from Play.
- Analyse your social design solution to find how it incorporates Bourdieu's economic, symbolic, social, and cultural capital. Methods: Context Playing, Video or Photo Sketch.

Modifiers

- Play & Sports Discipline, Logics, Stances, & Values, Role & Perspective, Persona, Impairment, Constrain, Technology, Game Structure.



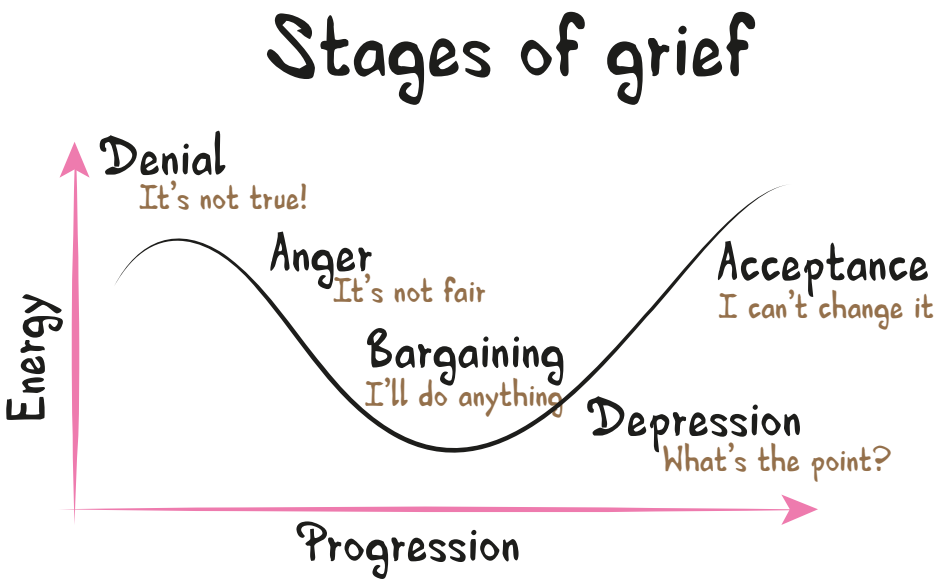
Understanding Humans in Society

Sports and Injuries

Designing for sports, whether it be technology or social aspects, it is crucial to consider sports injuries since injuries can have both physical and psychological consequences. Injured athletes can experience the feeling of isolation, anxiety, irritablility, and depression. Stress has a central role in sports injuries, and athletes with higher levels of life stress have a higher risk of getting injured.

Factors such as muscle imbalances, overtraining, physical fatigue, and high-speed collisions contribute to physical injury, while social, psychological and personality factors also contributes to injuries. Slogans like “Go hard or go home” and “No pain, no gain” can push athletes to accept injuries or take unnecesarry risks.

Rehabilitation when injured can be a long and challenging process, where the most significant source of stress is the psychological reactions to the injury. Injured atlehtes often follow a five-stage grief response process: denial, anger, bargaining, depression, and acceptance and reorganisation.



Sports and Injuries

If you're involved in designing for sports, it's crucial to acknowledge the impact of sports injuries on athletes' physical and psychological health. Understanding contributing factors like muscle imbalances, overtraining, and high-speed collisions can help you prioritise athlete well-being and create a culture that values health and safety.

Questions and Proposals

- To empathise with your users, move along with them in their lived life rehabilitation. Method: Empathy in Action, Digital Twin Sensitising in VR.
- Be guided by your knowledge of injuries, and role-play various movement ideas for preventing sports injuries for your solution. Method: Generate Movement from Imagery.
- Analyse your data to determine how your users experience rehabilitation using your sports and exercise solution. Method: Context Bodystorm, Strong Prototyping?

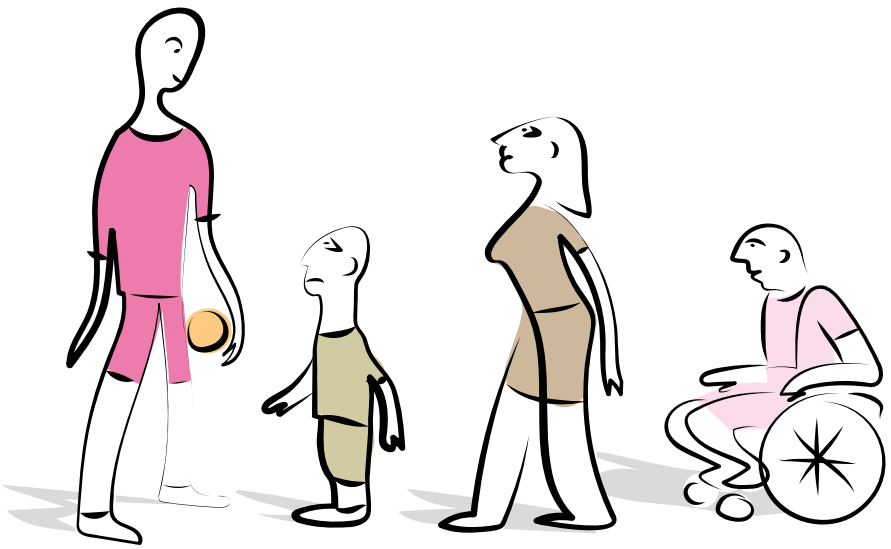
Modifiers

- Basic Movement, Training Element, Play & Sports Discipline, Logics, Stances & Values, Role & Perspective, Persona, Environment.

Understanding Humans in Society

Body and Sports Sociology

Complex relationships between sports participation and social inequality are a research subject in the field of sociology of sports. Knowledge about this contributes to making sports design aiming for equity. It is documented that sports offer potential avenues for social equity and improved health outcomes but also possibilities to reinforce existing social hierarchies and maintain discriminatory practices. Several key factors are identified through literature that shapes opportunities and outcomes in sports participation, including socio-economic status, race, gender, and cultural norms. Understanding the intricate interplay between these factors requires a multi-level analysis that considers individual choices, behaviours, broader social structures, and cultural values. The evidence emphasises the importance of inclusive technologies and equitable sports programs that promote access and participation for all, regardless of social background. The design of social sports solutions ought to analyse the relationship between sports and social inequality and identify effective strategies for promoting social justice in sports.



Body and Sports Sociology

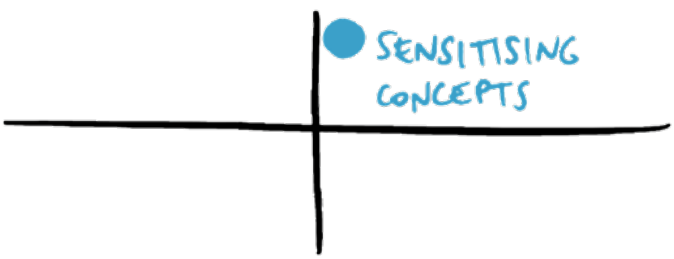
Did you know that sports can reinforce existing social hierarchies and, conversely, also offer potential avenues for social equity? Designing for sports involves understanding the intricate interplay between sports participation and social inequality. As a designer, you can take on the initiative and power to promote access and participation for all, regardless of social background.

Questions and Proposals

- What is the relevant knowledge of the body and sports sociology, and how can your design draw upon this field of research?
- Find your target group and play out and movement ideate different solutions for creating sports equality. Methods: Brain Walk.
- What insights do you get from analysing test data on how end-users perceive your design as a solution that considers inequalities? Method: Movement-Scenario, Roleplaying.

Modifiers

- Play & Sports Discipline, Logics, Stances & Values, Persona, Environment, Impairment, Constrain, Technology, Game Structure.



Understanding Humans in Society

Task Complexity

The Gentile taxonomy of motor skills is a framework to assess the level of task complexity in motor tasks. Gentile's Taxonomy consists of four classifications that together can determine a task complexity.

Body transport

Activities that necessitate a performer to move their body through space are typically more complex than activities that do not necessitate body transport.

Object manipulation (+ vs - M)

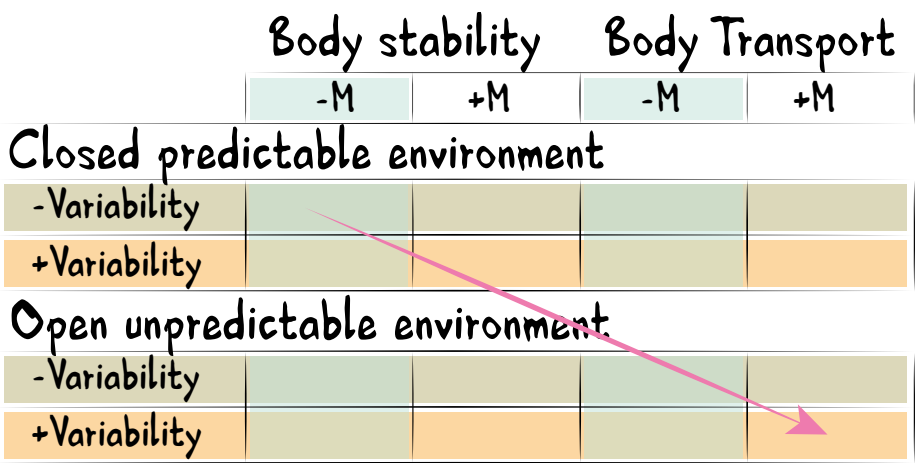
Activities that necessitate the manipulation of objects are typically more complex than activities that do not.

Target transport (open vs closed environment)

Activities that necessitate a performer to coordinate their actions relative to a moving target are typically more complex than activities that do not.

Variability (+ vs - Variability)

Activities involving variability between trails are typically considered more complex than activities with no variation between trials.



Task Complexity

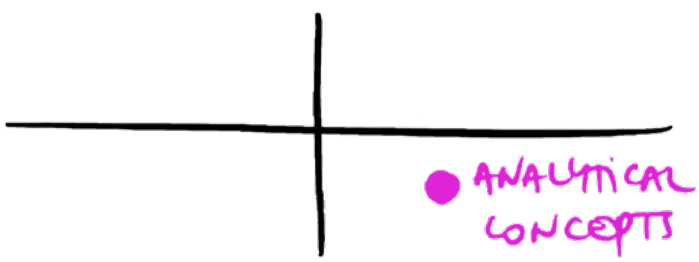
How to level up your user? Designing increasingly difficult tasks for your users can be challenging. With Gentile's taxonomy of task complexity, you can carefully analyse sports skills and design skill progressions by adding 'self-motion', 'object manipulation', 'target motion, and 'variability' to your task.

Questions and Proposals

- How can you increase the task complexity of your activity by changing the following:
  1. The requirements for self-motion?
  2. The involvement of target motion?
  3. The criteria for object manipulation?
  4. The involvement of variability?
- Is the task complexity fitting for your users? Methods: Roleplaying.
- How does your sports solutions' test data show that task complexity increases progressively? Method: Strong Prototyping.

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline, Play Element, Persona, Environment, Imairment.



Motor Learning and Biomechanics

Motor Learning and Skill Acquisition

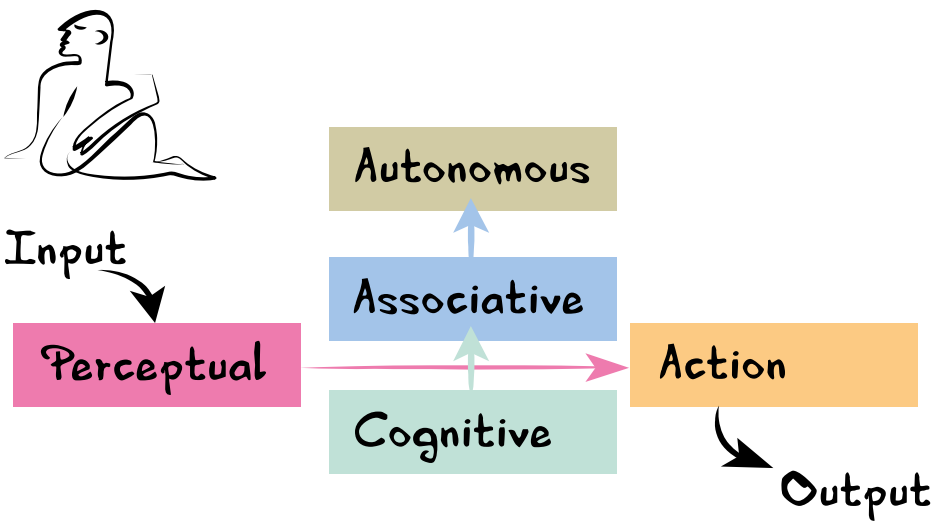
Knowledge about motor control and stages of skill learning is an area where designers of movement-based technology can benefit.

The 85% rule: in designing difficulty progressions, tutorials etc., it's good to maintain an 85% success rate to ensure optimal skill acquisition.

Empirical findings on designing optimal skill progressions, factors affecting the difficulty of decision making such as complexity and time pressure and how they can be manipulated.

Motor skills and embodied experiences include an understanding of, e.g., Fitt's law, limits of attention and multitasking, stimulus-response compatibility, motor control as nested feedback loops and the trade-off between slow, conscious control and automated/non-conscious fast control, and how real-time/low-latency feedback can be both beneficial and detrimental to skill acquisition.

Evidence on augmented feedback is used to inform feedback design. This includes principles on timing, modality, frequency, and content of the feedback, which is crucial to ensure effectiveness in learning.



Motor Learning and Skill Acquisition

Knowledge about motor control and skill learning stages can benefit your movement-based technology design. Consider guiding your design by limits of attention and multitasking, stimulus-response compatibility, motor control as nested feedback loops and the trade-off between slow, conscious control and automated/tacit fast control.

Questions and Proposals

- How can your skill-learning technology guide and manipulate complexity & time pressure? Method: Context Playing, Roleplaying.
- How will you include limits of attention and multitasking, stimulus-response compatibility, nested feedback loops and the trade-off between slow, conscious control vs automated/tacit control in your sports skill learning solution? Method: Build & Describe.
- Observe and describe how human interaction occurs regarding the 85% rule plus complexity & time pressure. Method: Strong Prototyping.

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline, Environment, Imairment, Constrain, Technology.

Motor Learning and Biomechanics

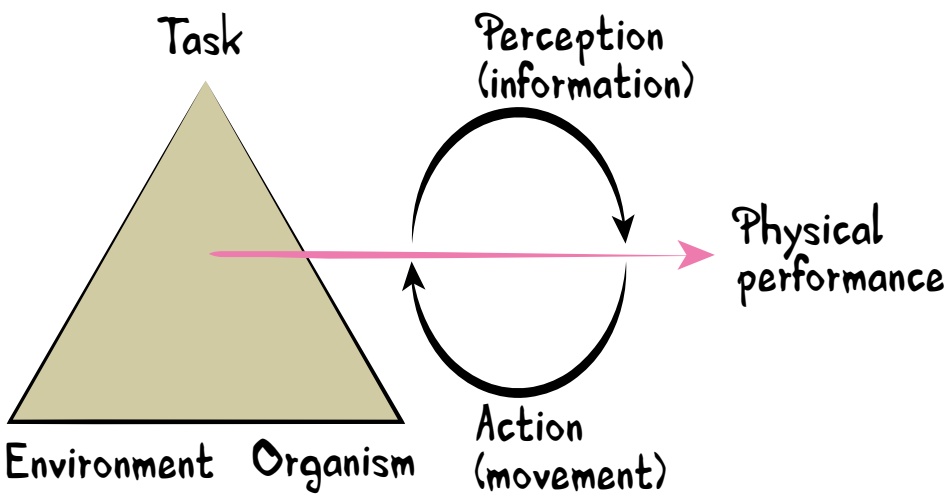
Constraints-led approach

The Constraints-Led Approach, developed by Newell, holds that action emerges from the dynamic interplay of athlete constraints, task constraints, and environmental constraints. Actions are consequential to the way athlete, environments, and tasks interact. Movement is not the cause but the result of these factors. Movement constraints can be divided into three classes: athlete constraints, environment constraints and task constraints. Each of these can be manipulated to have behaviour emerge.

Athlete constraints: all factors that relate to the athlete that shape the athlete's performance, including body weight, body composition, heart rate, motivation, and mood.

Environment constraints: all factors that relate to the environment that shape the athlete's performance, including ambient light, weather, social context, and ground surface.

Task constraints: all factors that relate to the task at hand that shape the athlete's performance, including game rules and overarching activity goals.



Constraints-led approach

In designing your sports solution, you may be guided by the theory that movement learning is a constraint-led affair. Consider that sports action emerges from the interplay of athlete, task, and environmental constraints and is consequential to how athletes, environments, and tasks interact.

Questions and Proposals

- Try to change the environmental constraints by modifying physical elements in the context of performance. Method: Context Bodystorm.
- Can you change the task constraints to modify the emergent behaviour in your activity? Method: Generate Movement from Imagery.
- Consider constraints in your focal activity. Do any constraints work against the intention? Method: Roleplaying.
- Do your test data show constraints highlighted to promote the intended nature of your activity? Method: Video or Photo Sketch.

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline, Persona, Environment, Constrain, Technology.

Motor Learning and Biomechanics

Feedback Design for Motor Learning

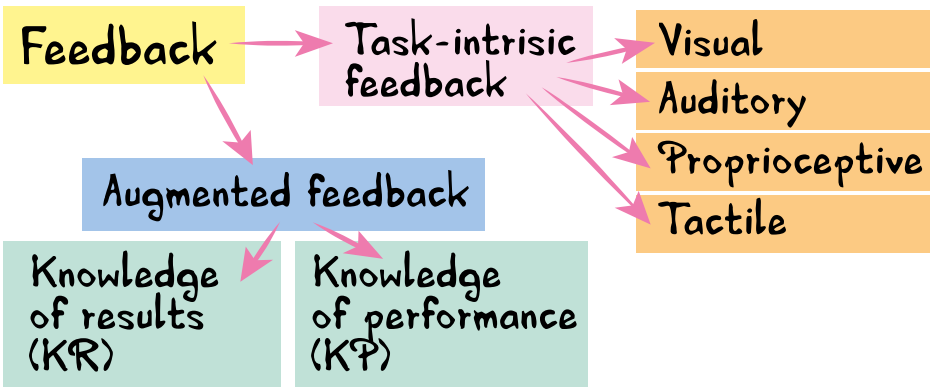
Feedback is an agent's information about performance and drives motor learning in movement-based activities. Feedback can be task-intrinsic or augmented. For the later it is divided into knowledge of results (KR), which is provided on the movement outcome. Knowledge of performance (KP) and feedback are provided on the movement execution. Generally, KP is superior to KR.

Qualitative feedback offers a qualification of skill execution. Quantitative feedback is more specific. However, too detailed feedback might hamper learning/performance.

Descriptive feedback is factual and typically sufficient for experts. Prescriptive feedback, what to do, is subjective and especially beneficial for novices.

Positive feedback (what went properly) is considered motivating. Negative feedback (what went wrong) is essential to support the learning process.

Feedback that is provided too often might hamper learning as learners depend on the feedback provided, known as the 'guidance hypothesis'. Concider using feedback fading schemes: fading feedback, bandwidth feedback, self-selection feedback, average feedback, and summary feedback.



Feedback Design for Motor Learning

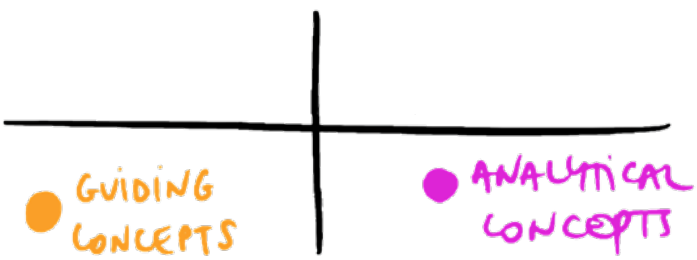
How should feedback be designed to guide learning and skill acquisition in sports and movement? Study and analyse the nature of feedback (e.g., type, content, precision, focus, and validity) and how to reduce the feedback frequency over time (e.g., fading, bandwidth, self-selection, average).

Questions and Proposals

- How can you change the feedback design of your system to cater to different target goals (engagement, performance, learning)? Method: Sensing Through Object.
- Act out movement ideation to apply:
  1. Qualitative and quantitative feedback
  2. Descriptive and prescriptive feedback
  3. Positive and negative feedback.
- Does your design already have a feedback reduction scheme? Can you apply different ones? Method: Mockups for Movement Design.

Modifiers

- Basic Movement, Training Element, Play & Sports Discipline, Metaphor, Logics, Stances & Values, Role & Perspective, Persona, Environment, Impairment, Constrain, Technology.



Motor Learning and Biomechanics

Simplifying Motor Tasks Learning

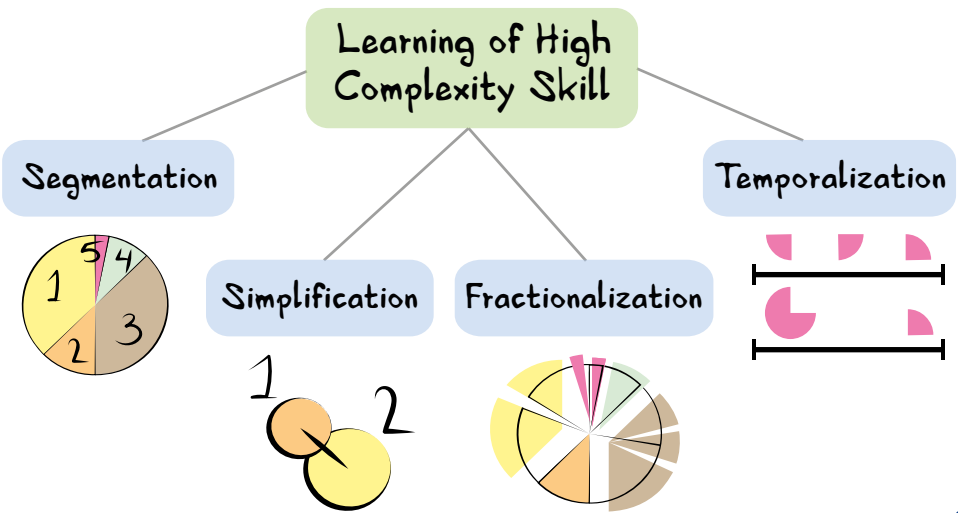
The skill may be simplified when task complexity is high, and learners struggle to complete the skill they intend to practice. There are four approaches to simplifying skills: segmentation, simplification, fractionalisation, and temporalisation.

The skill is split with segmentation, and each part is practised in isolation. For javelin, first practice the run-up, then the throw, and then the entire skill.

With simplification, the skill is simplified to reduce the temporal-structural demands. In baseball, e.g., learners might practice batting by hitting the ball from a 'batting-tee' instead of a pitched ball.

With fractionalisation, the skill is temporally disentangled to ease execution. In dancing, e.g., learners may need to coordinate hands and feet. Practising may be split up by practising the coordination of the hands, then the feet, and then the simultaneous coordination of the hands and feet.

With temporalisation, the skill is slowed to ease execution. In practising skiing, e.g., learners may first practice their skills on a shallow slope (slow) and then progressively on a steeper slope (fast).



Simplifying Motor Tasks Learning

How to simplify tasks that are too difficult for an athlete or user to perform? You can be guided by roughly four approaches: segmentation (breaking up into component parts), simplification (reducing the demands), fractionalisation (element training) and temporalisation (slowing down the execution).

Questions and Proposals

- Learn movements along with your athlete users to sensitise their motor learning.
- Can you implement one or multiple partitioning approaches in your system design?
- Did you implement a partitioning approach to fit the skill level of your user?
- Can you incrementally adjust the difficulty level to guide the learning process?
- Does the partitioning approach serve your users?
- What are your athlete users' experiences testing your partitioning solution?

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline, Persona, Impairment, Constrain, Technology.

Motor Learning and Biomechanics

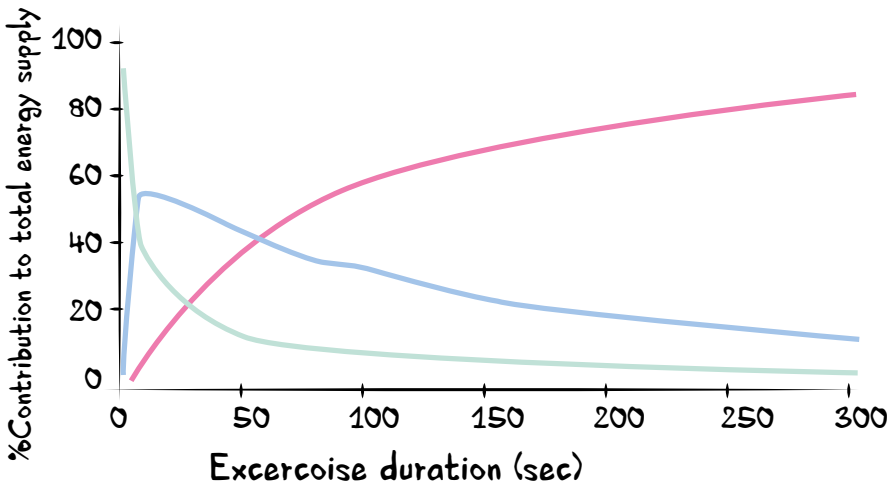
Bioenergetics of Sports and Movement

Bioenergetics is the study of energy consumption and metabolism for movement, and there are two bioenergetic systems: the anaerobic and aerobic systems. The anaerobic system delivers energy without the use of oxygen through the breakdown of glucose and phosphocreatine and is the primary energy supplier for short bursts of activity. The phosho-creatine system is one of the two anaerobic systems most effective for very short bursts of action.

The anaerobic breakdown of glucose and glycogen dominates during longer intense periods of high-intensity exercise (30-60s).

On the other hand, the aerobic system releases energy through the breakdown of carbohydrates, fats, and proteins with the help of oxygen. It is the primary energy supplier for endurance sports.

Understanding the different bioenergetic systems is crucial for athletes and coaches to maximize their performance. Proper training and nutrition can be tailored to support the body's energy needs during various activities, and this knowledge can inform the improvement of athletic performance.



Bioenergetics of Sports and Movement

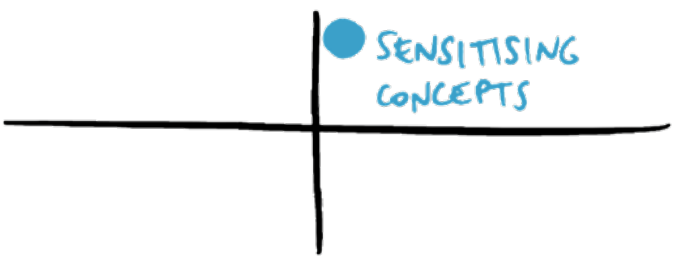
How to design movement activities for strength, interval, or endurance training? Study and sensitise the bioenergetic pathways (an-aerobic and aerobic energy systems) which are involved with your target activity and match those to your movement activities.

Questions and Proposals

- How can bioenergetic pathways be target-ed through your design? Method: Explore Movement.
- Movement ideate (embodiate) various movements to change the exercise dura-tion/fluctuation in energy consumption to involve different energetic pathways. Method: Context Bodystorm.
- Does the test data of your solution match the primary involved bioenergetic path of your target sport/exercise? Method: Strong Prototyping.

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline, Environment, Impairment, Technology.



Physical Training and Physiology

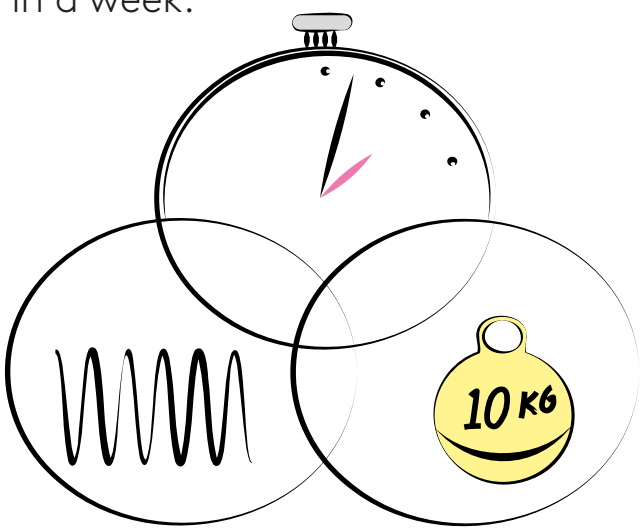
Training Load

Designing for physical activity, considering the training load, which is the strain on the athlete, is crucial. Training load composes of internal and external load, where internal is the physiological response and external is the measurable strain. The focus is on managing external load through duration, frequency, and intensity, for instance, by adjusting a running session by changing the distance, the number of sessions, and the running speed.

Duration
The duration of an activity can affect the training load. For example, running can be adjusted by running shorter or longer distances.

Intensity
The intensity of an activity can impact the training load, e.g., by slowing down or speeding up or no. of running intervals. Intensity can be measured internally as heart rate and externally as pace (min/km).

Frequency
The frequency of the activity can also affect the training load by having fewer or more training sessions in a week.



Training Load

How to guide and offer athletes the ideal physical challenge? You can vary in training duration, frequency, and intensity to provide your user with an optimal training load. Monitor the user's exertion through their breathing, heart rate, and rate of perceived exertion (RPE).

Questions and Proposals

- Can you adjust one of the following: duration, frequency or intensity to alter the training load? Method: Roleplaying.
- Consider the current level of exertion of your activity. Does it support/distract from the purpose of the game? Method: Strong Prototyping.
- How does your solution's test data show your current level of exertion of your activity? Are the duration, frequency, and intensity balanced at the desired level? Method: Video or Photo Sketch.

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline, Environment, Impairment, Constrain.

Physical Training and Physiology

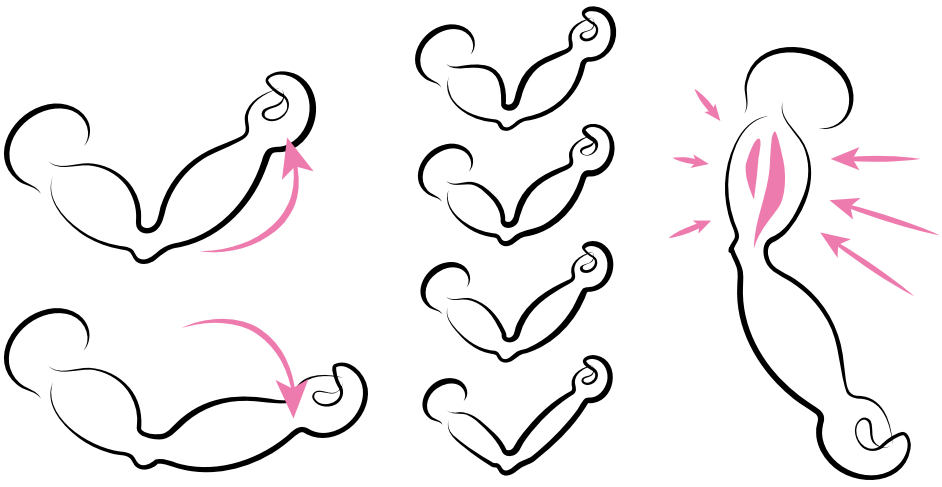
Training Principles

When designing training interventions, there are three core principles to keep in mind: the principle of specificity, reversibility and overload.

The principle of specificity suggests that the training context must be representative of the performance context to maximize the benefits of the training. The principle of specificity applies to muscle activation patterns; player interaction patterns; muscle physiology; and other aspects of the movement.

The reversibility principle states that training gains fade if practice discontinues. The principle of reversibility applies to movement aspects such as coordination and conditioning but impacts each of these differently.

The principle of overload holds that the athlete's system should be overloaded for training effects to occur. Thus, overload can be achieved gradually by progressing the training load through training duration, -intensity, and/or -frequency adjusting.



Specificity Reversibility Overload

Training Principles

What training principles should you consider in designing your (long-term) training interventions? First, specificity: training should resemble performance. Second, overload: no gains without challenge. And third, reversibility: gains fade if practice discontinues.

Questions and Proposals

- How can you design your system to match:
  1. physiological needs of the target activity?
  2. muscle coordination of the target activity?
  3. player interaction of the target activity?
- How can you design your system to overload the athlete's system in three ways: intensity, frequency, and duration? Method: Roleplaying and Explore Movement.
- Does the test data of your solution account for specificity and the potential effects of reversibility?

Modifiers

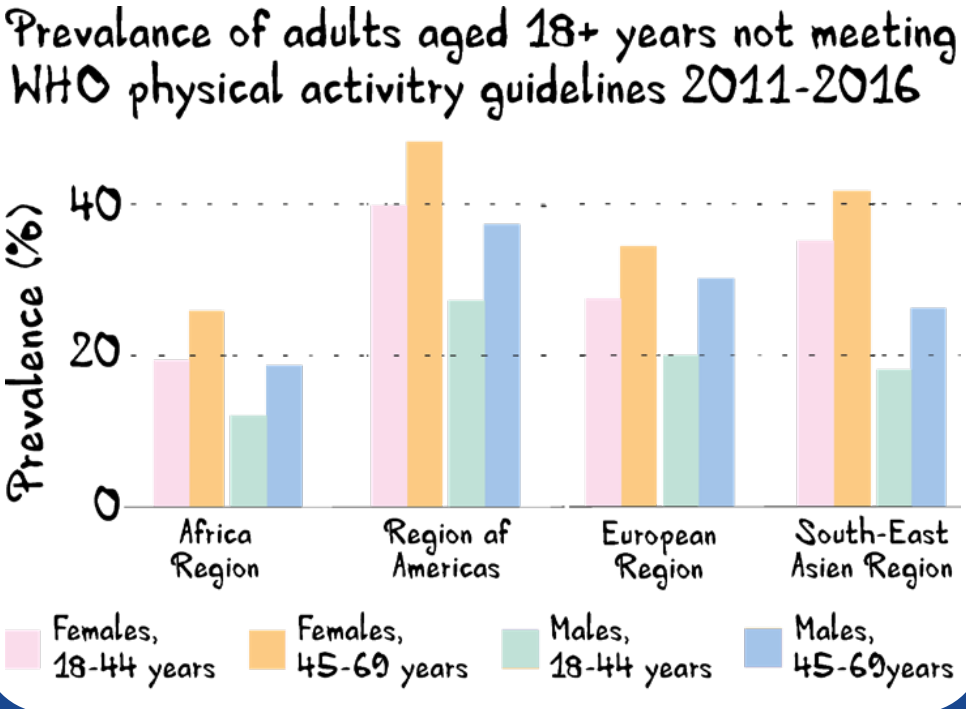
- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline.

Physical Training and Physiology

Physical activity trends

Physical inactivity is a growing problem globally with a significant impact on public health. According to the World Health Organization (WHO), one-third of the world's population above the age of 15 is not participating in enough physical activity. This lack of exercise is believed to contribute to the deaths of 3.2 million people each year. A study from 2018 showed that the amount of physical activity people is getting has not improved much since 2001, in fact PA levels decreased by 5%.

Physical activity is essential for overall health and well-being; people must understand this and make it a part of their daily lives. The WHO believes that more needs to be done to encourage people to be physically active and has called for a scaling up of efforts to promote physical activity worldwide. This includes making physical activity more accessible and encouraging people to be active at work, at home, in transportation, and in leisure time.



Physical activity trends

As a movement designer, do you need evidence of the growing inactivity crises in our society?

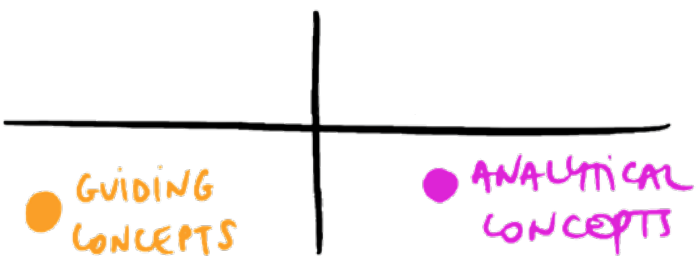
We recommend you guide and analyse your concept using the WHO review studies of world health, which focus on movement and physical activity as a health-promoting factors in some sections.

Questions and Proposals

- Try to act out different target groups everyday life using the method Daily Movement - how can your design solution provide more activity for the target group?
- Can you change your activity's duration, intensity, or frequency to decrease/increase the load?
- What insights do your test data provide about your user's application of the sports solution using the method of Strong Prototyping?

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play Element, Logic, Stance & Value, Persona, Environment, Persona.



Physical Training and Physiology

Endurance Training

Endurance is the ability to resist fatigue during activities for a long duration. There are four types of endurance training methods used by athletes.

The slow continuous method involves longer sessions at low intensity. The fast continuous involves higher intensities without taking any breaks between the exercise. The variable pace method is also referred to as interval training, combining short periods (3-8min) of high-intensity interspersed by recovery periods at lower intensities.

The interval training method is a type of training that provides time for recovery between repetitions. Based on the desired outcome, interval training can be adjusted by changing the intensity and duration of the intervals and the recovery period in between.

The fartlek training method involves running continuously at various speeds, including short repetitive periods at very high intensities, followed by running at a slow pace from 20 minutes to 60 minutes.

Further, test methods can be used to monitor the athletes and to evaluate the effects of training interventions essential for developing an athlete.

Methods to improve endurance training

- Duration load method
  - Continous method
    - Slow continous method
    - Fast continous method
    - Variable pace method
  - Fartlek training method
- Repetition method
- Interval training method
  - Extensive interval training
  - Intensive interval training
- Competition and test method

Endurance Training

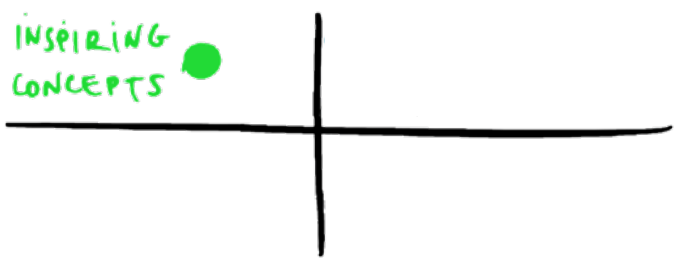
Designing your training solution, be inspired by the five types of endurance training methods used by athletes. Consider slow continuous, fast continuous, interval training, competition and test methods, or the fartlek training method.

Questions and Proposals

- Go along with and sensitise athletes, users or persons doing endurance Training. Methods: Collaborative Somatic Inquiries.
- Try to act out various movement ideas supporting your endurance solution. Methods: Explore Movement, Brain Walk.
- How are the various forms of endurance training relevant to the solution you are designing? Method: Context Playing.
- What are your users experiencing, and what does your test data shows regarding the endurance training solutions? Methods: Strong Prototyping, Video or Photo Sketch.

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline, Environment, Constrain, Technology.



Physical Training and Physiology

Strength Training

There are different qualities to strength training. Regarding strength, athletes can be said to have great strength, great power, or great endurance; each takes a different approach to training.

Load training aims to improve the maximal weight that an athlete can lift/endure. To attain maximal strength quality, an athlete will train using (near) maximum weights and perform 1-3 repetitions in a low number of sets.

Power training aims to improve the power that an athlete can maximally produce, with power being weight displaced per unit of time. Power output is maximal at approximately 30% of muscle contraction speed. For power gains, athletes should train with heavy loads at high speeds. The number of repetitions should be kept low, depending on the application. Athletes would want to train for a high jump with 1-2 repetitions. For playing basketball, which involves a lot of jumping, athletes would like to introduce 5-10 repetitions.

Strength training can also be tailored to increase endurance. Athletes should train with small loads at high speeds, using many repetitions (e.g., 10-25) over multiple sets, for instance, for runners.

Content	Maximum	Explosive	Strength endurance
Intensity	80% - 100%	60% - 70%	Up to 50%
Density	300 sec - 480 sec Full recovery is requered	300 sec - 480 sec Full recovery is requered	90 sec - 180 sec Some recovery is requered
Frequenzy	1 to 4	6 to 10	15 to 28
Duration	MORE	SHORT	SHORT

Strength Training

What training principles should you consider guiding your movement solutions design for strength training? Regarding strength, athletes and users can gain significant strength, great power, or great strength endurance; each type takes a different training approach.

Questions and Proposals

- Can you think of a design element that would promote:
  1. maximal strength?
  2. power?
  3. strength-endurance?
- How are the various strength components relevant to the activity you are designing for? Method: Empathy in Action.
- Testing your strength solution, does your users' data show users responses regarding targeting the intended quality? Method: Strong Prototyping, Video or Photo Sketch?

Modifiers

- Basic Movement, Movement Perspective, Training Element, Play & Sports Discipline, Environment, Constrain, Technology.

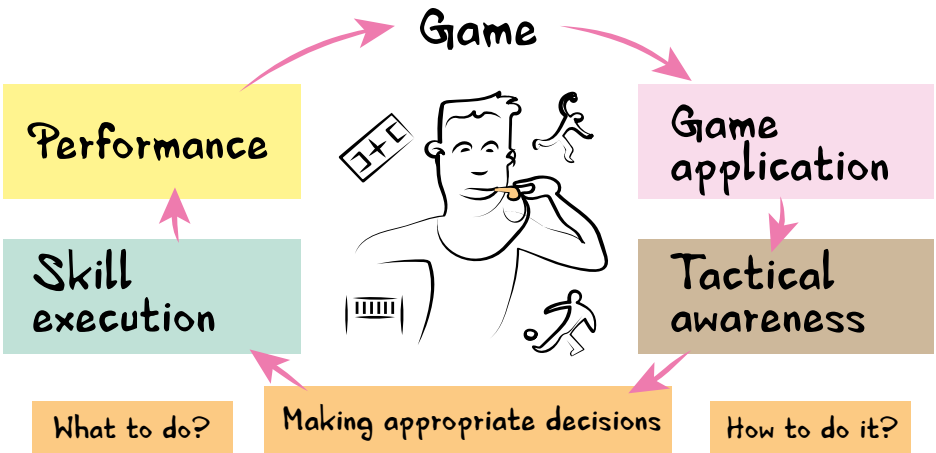
Physical Training and Physiology

Teaching Games for Understanding

Teaching Games for Understanding (TGfU) principles can help designers, coaches, and educators design enriching ball game solutions that promote tactical understanding and decision-making skills among players and students, which could ultimately enhance their overall performance and enjoyment of the sport.

The TGFU is a game-centred teaching approach that introduces students to the demands of full-scale sports by simplifying them for players' physical, social, and mental development. The strategy aims to develop players' performance in game-playing situations, gradually evolving towards the sophisticated final games.

Selected sports pedagogical theories classify games based on physical properties and primary rules. Four game forms are identified: target games like golf or curling; courts or net/wall games like tennis or squash; field or striking/fielding games such as cricket and baseball; and territory or invasion games like rugby, football or basketball. Key principles for designing game drills include using modified rules, task constraints, and tactical awareness training.



Teaching Games for Understanding

Do you like designing for a basic tactical understanding of games and sports? Consider starting from a game structure approach and background the technical skill-based approach. You may gain from guiding the players' game intelligence and physical, social, and mental development.

Questions and Proposals

- Which target user does your play solution aim for? Try the method of Empathy in Action.
- Generate gameplay drills for your solution with either rules, task constraints, and tactical awareness for movement ideation. Or use the method Generate Games from Play.
- How do your players/end users experience game appreciation? Try using the method of Context Playing and Video or Photo Sketch.

Modifiers

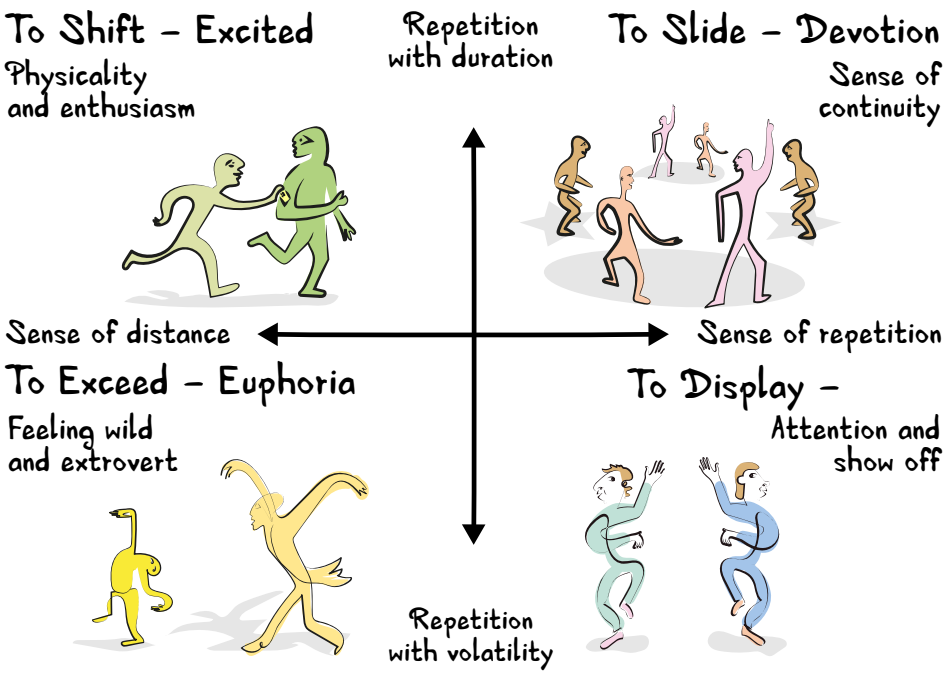
- Movement Perspective, Play & Sports Discipline, Play Elements, Play Perspective, Metaphor, Persona, Environment, Impairment, Constrain, Environment, Logic, Stance & Value, Game Genre, and Game Structure.

Sports, Games and Play

Play Moods

Play is, stated by Skovbjerg, a relationship between play media, play practices, and play moods. The play media is the artefacts or toy of play; the play practices describe how to use the media, and the play moods represent the player's motivation and goal for playing. This creates a practice of mood, where different actions with play media lead to different experiences. Play moods are a crucial aspect of play, serving as a precondition and goal.

Designers can use the idea of play moods to get into a creative, bodily state and maintain it during the design process and also use play moods as an aim of a movement solution. Four play moods have been defined: devotion, intensity, tension, and euphoria (characterized by silliness). Shifting between play moods is a vital part of play and helps sustain a playful practice. This can also lead to new design ideas and perspectives in a design process that incorporates shifting play moods.



Play Moods

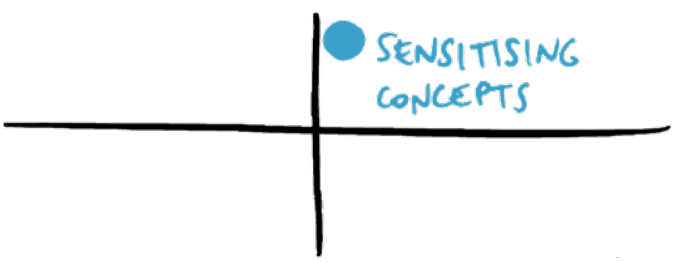
Have you ever wondered what play is and what existential form play can take? Sensitising that play activities are a form of practice that includes play media and creates an atmosphere with a self-contained value will likely help your design.

Questions and Proposals

- Try sentisining the play moods the design practice generate among your end-user / participants? Methods: Sensing Through Object.
- Generate movement ideas and experiment with play practices using various play media. methods What Can I Do With This? or Generate Games from Play.
- Generate movement-enhancing moods of devotion, intensity, tension, or euphoria.
- What play moods are optimal for your users when they play in your design solution? Methods Strong Prototyping.

Modifiers

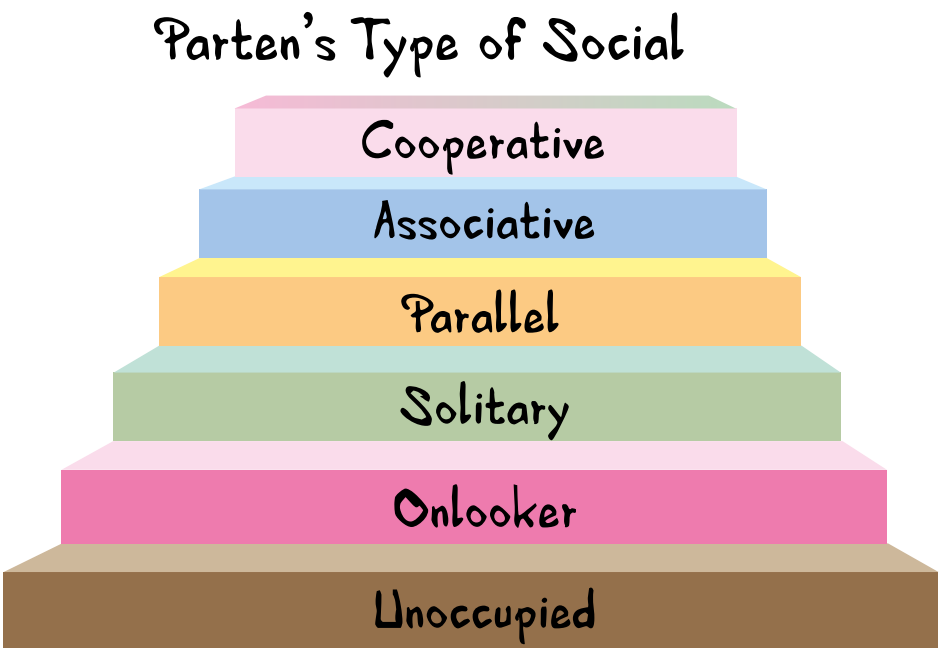
- Play & Sports Discipline, Play Elements, Play Perspective, Metaphor, Persone, Game Genre, and Game Structure.



Sports, Games and Play

Social Play

Social play is a phenomenon rather than a theory, defined as the active engagement with a game by more than one person. Social games and social play also have a direct connection to bodily play. Research has shown that games are an optimal environment for trust formation due to their ability to simulate risk and interdependence. This builds genuine social bonds between players and fosters inter-personal trust and intimate connections. Social play also presents a good framework for icebreaking activities and is accepted as a viable team-building exercise, even in a business context. Icebreaking games can improve group communication and participation and potentially lead to benefits in future face-to-face collaboration. Hence, the social play offers a rich domain for movement-based design and a common element in movement-based design methods. For example, social play is prominent in sports practices, even if mostly in team-based competitive forms.



Social Play

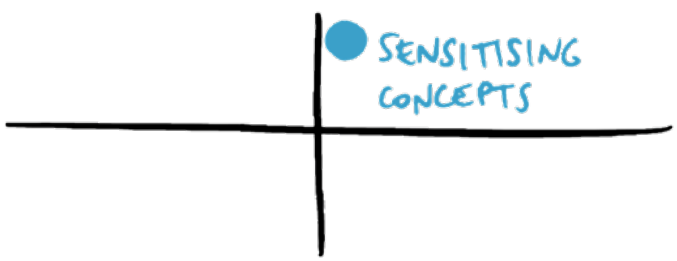
A common challenge in designing for physical movement and play is to include the social aspects of play. You may modify the activity or create parallel, coordinated activities that include various social play types. Sensitise similarities and also differences. Most play activities are physical and primarily collaborative, interactive or competitive.

Questions and Proposals

- What types of social play are exposed when playing and sensitising with your playmates? Method: Explore Movement.
- Generate social play; unoccupied or solitary, onlooker, parallel, associative, or cooperative in your movement ideation. Methods: Embodied Sketching or Generate Games from Play.
- Which types of social play does the play solution generate among your end-user? Method Context Playing and Video or Photo Sketch.

Modifiers

- Play Elements, Play Perspective, Metaphor, Persone, Game Genre, and Game Structure, Constrain, Role & Perspective, Logic, Stance & Value, Technology, Game Mechanic.



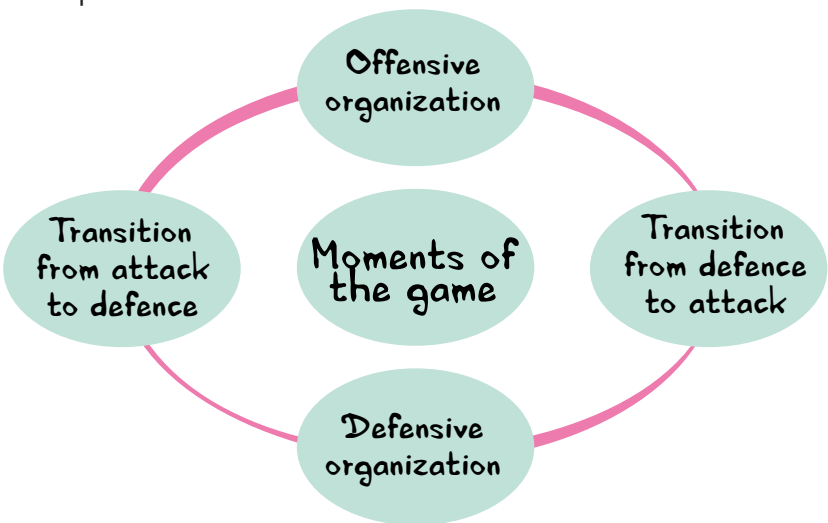
Sports, Games and Play

General Tactics in Ball Games

We propose understanding the essential tactical components of these complex and dynamic games to design social or digital solutions for ball games such as soccer, basketball, and rugby. Players are required to make quick decisions based on the actions of their opponents and teammates. To enhance tactical understanding, there have been identified non-specific tactical tasks that players must be proficient in and are essential for success. The model below simplifies the ball game into four main phases of the play.

The seven situated tactical tasks focused are: (1) attacking the goal, (2) taking the ball near the goal, (3) playing together, (4) identification of gaps, (5) feinting, (6) achieving an advantage, and (7) supporting and orienting.

Focusing on these tasks, coaches can help players improve their decision-making, game awareness, and technical skills, leading to better overall performance. Furthermore, this approach can be adapted to various age groups and skill levels, making it a valuable tool for coaches at all levels of the sport.



General Tactics in Ball Games

In designing ball game solutions, we propose focusing on tactical challenges to help players improve their decision-making, game awareness, and technical skills, leading to better overall performance. Guide your solution to be a valuable tool for coaches and players.

Questions and Proposals

- How are you sensitising the tactical elements of the specific game? Method: Roleplaying.
- Act out movement ideation or redesign to generate gameplay drills for either (1) attacking the goal, (2) taking the ball near the goal, (3) playing together, (4) identification of gaps, (5) feinting, (6) achieving an advantage, and (7) supporting and orienting.
- Which elements of your ballgame solution make players make fast in-game decisions, and how do they experience ballgame tactical tasks? Method: Embodied Storming.

Modifiers

- Play & Sports Discipline, Play Elements, Play Perspective, Technology, Persona, Game Genre, Game Structure, and Game Mechanic.

Sports, Games and Play

Skill Differentiation & Balancing

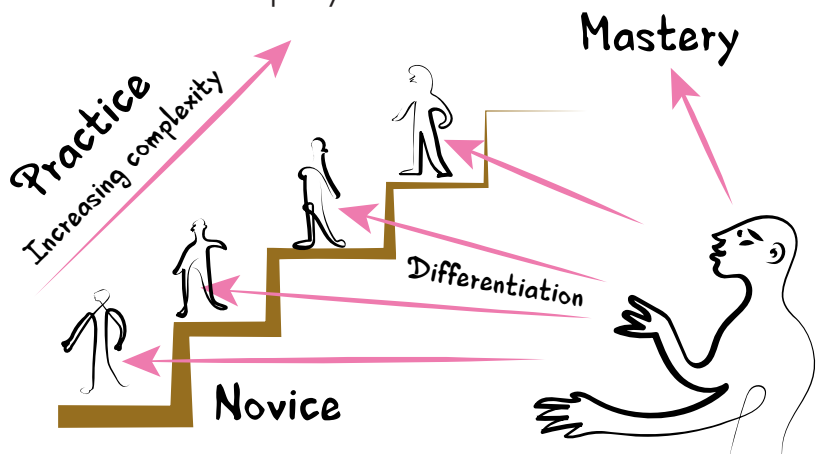
Players' skill levels differ in sports, games, and play based on the player's experience levels and physical capacities can be desirable in the contest or undesirable in inclusive play. The following presents ways to balance participants' skills.

Balancing can be either positive or negative. In positive balancing, the action capabilities of the weaker player are enhanced to even the odds. With negative balancing, the action capabilities of the stronger player are restricted to even the odds.

Balancing can either be static or dynamic. Static is applied before the start of an activity, for example, in the form of matchmaking. Dynamic is performed in real-time during the game.

Balancing can affect the player's (internal) skills, abilities, fitness, and physique. Asking a player to play with their non-dominant hand in tennis would be a form of internal balancing. External balancing applies to physical tasks or social environments, limiting a tennis player to using half playing field.

Balancing can be overt or covert – thus, players are unaware of the differentiation. Balancing can be either under the control of the designer or under the control of the player.



Skill Differentiation & Balancing

Are you challenged on how players' skill levels differ in sports and games? The player's experience levels and physical capacities can be desirable in the contest or undesirable in inclusive play. You may consider ways to guide your balancing of participants' skills in your game design or coaching.

Questions and Proposals

- How do you sense a skill differential between players? Method: Empathy in Action.
- How can you balance the skill differential between players through:
  1. positive and negative balancing?
  2. static and dynamic balancing?
  3. internal and external balancing?
  4. overt and covert balancing?
- How will you control the balancing of the activity, or how would you ensure that players control the balancing of the game or activity? Method: Context Playing.

Modifiers

- Movement Perspective, Play & Sports Discipline, Logics, Stances & Values, Impairment, Constrain, Technology, Game Structure.

Sports, Games and Play

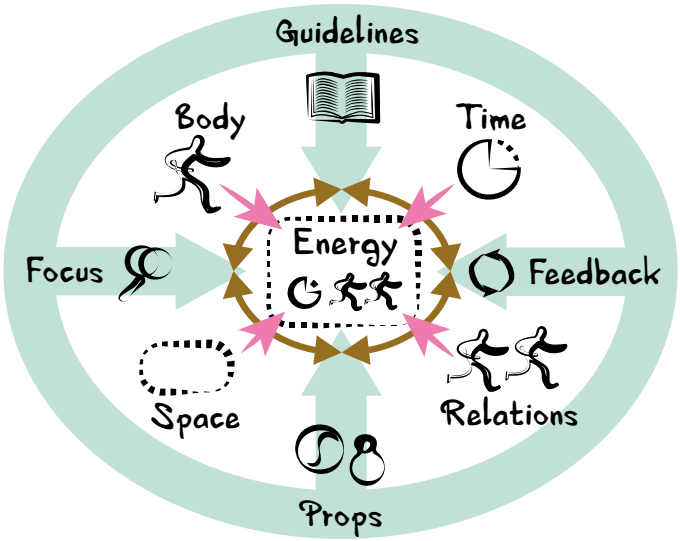
Sports Activity Development Model

The activity development model is made to plan and implements activities to achieve enriching experiences or develop a given area of movement. The model comprises five phases: idea development, planning, implementation, evaluation and adjustment.

Idea development involves identifying the need for activity and generating ideas on how to meet that need. The planning includes elements from the activity development wheel; focus, body, guidelines, feedback, space, props, relationships, and energy. The planning phase focuses on preparing a detailed plan for the activity, including objectives, resources and time frames. The implementation phase involves the actual execution of the activity.

Evaluation is critical to assess whether the objectives have been met and whether the activity has had the desired effect. Needed adjustments will be implemented in the final developed activities.

The flexible model focuses on a systematic and iterative approach, with continuous adjustments based on the evaluation.



Sports Activity Development Model

Do you have a challenge developing creative sports and movement activities? We propose using the Activity Developing Model, by which you can guide on a focus and consider the body, guidelines, feedback, space, props, relationships, and energy.

Questions and Proposals

- Act out elements of the activity that focuses on creating different types of energy; fun, intensity, and friendliness. Methods: Generate Movement from Imagery.
- Generate movement activities for your solution with either props or relationships or use/extend the space for a movement activity. Methods: What Can I Do With This?
- How is your participant's user experience in the activity? Method: Context Playing.
- How does your movement activity support personal and social development? Method: Video or Photo Sketch.

Modifiers

- Movement Perspective, Play Elements, Play Perspective, Metaphor, Role & Perspective, Persona, Environment, Impairment, Constrain.

Sports, Games and Play

The Sports Tech Framework

Sports technology is a "human-made means to reach human interests and goals in or related to sport." The SportsTech framework provides a comprehensive overview that is valuable for the technologies shaping the future of sports. Beyond the athlete-focused, it includes consumers (fans) and technologies for management.

Three outcomes are targeted in sports technology design: Engagement, Performance, and Learning.

Engagement emphasizes the inclusion of hedonistic aspects such as 'aesthetics, fun and excitement'. Performance is the ability to execute a skill, often framed in the scope of excellence. Motor learning concerns the acquisition of new skills or the refinement of existing skills.

Three different technology domains can support movement and sports: physical technology, data science, and interaction technology.

Many technologies combine different domains by, e.g. taking elements from data science and combining those with physical technology.

User angle / Tech angle	Athletes	Consumer	Management
Advanced materals, sensors, and biotech	Wearables and Game equipment	Fan Engagement Ticketing & Merchandise	Team, Club & Stadium Management
Data and machine learning	Tracking, Classes, Tutorials, & Video Analytics	Fantasy Sports, Betting, & Sport Games	Scouting, League, Event, & Management
Communication, and extended reality	Recovery, Injury Prevention, Rehab, & Coaching	News, Content, Streaming, & OTT platforms	Media Production, Sponsor, & Crowdfunding

The Sports Tech Framework

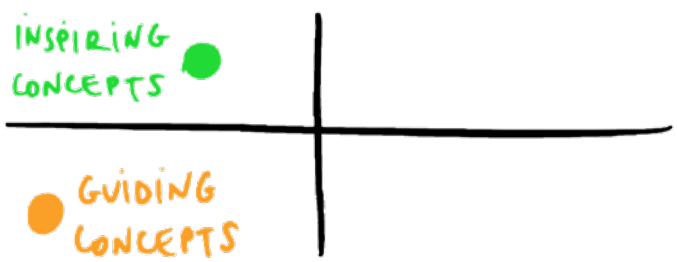
As a sports technology designer, do you need an overview of the different technologies offered? We recommend that you inspire and guide your sports solution development using the sports technology framework that covers a user angle and a technology angle.

Questions and Proposals

- Every technology domain has its pros and cons. To understand whether you are using the selected technology best, ask: Can I reach the same objective through different means?
- Which pitfall will your user-tech decision impose on the athlete or your customer? Try using the method of Roleplaying to unfold technologies' pros and cons.
- What insights do your test date provide you, focusing on engagement, performance, or learning as target outcomes?

Modifiers

- Basic Movement , Movement Perspective, Training Element, Play & Sports Discipline, Persona, Technology, Logic, Stance & Value, Role & Perspective, Environment, Constrain.



Sports and Movement Technologies

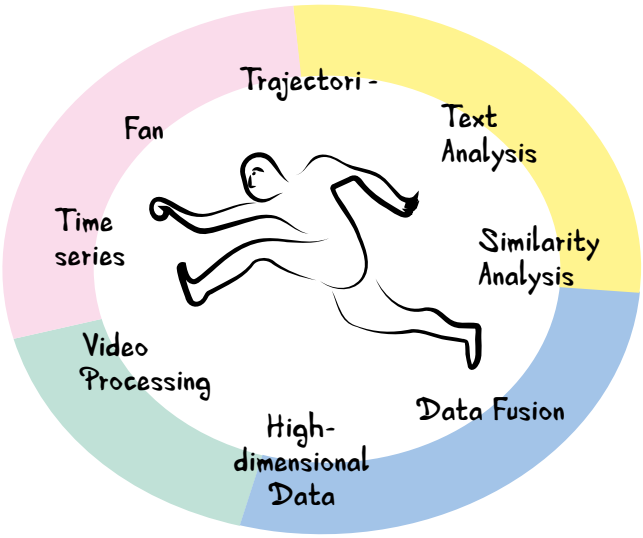
Sports Data and Internet of Things

Connecting peoples' behaviour and things to the internet through sensor technology and wireless data connectivity is possible. Internet-connected things can be controlled remotely and gather data about their environment and users. This has been called the 'Internet of Things (IoT) and has many uses in the sports domain. Important uses are:

Sports designers can harvest big sports big-data to gain insights into athletes' needs and preferences, which help them create new sports products that:

- Monitor and instruct players, e.g. measure player efficiency, spot and correct errors, and develop and communicate team play strategies.
- Monitor players to maintain injury safety.
- Allow fans richer ways to engage with games
- Integrating sports technology, data analytics, and AI has improved sports products.

Issues such as open big data and privacy protections remain unresolved regarding AI. Addressing these issues is critical for ensuring the responsible use of big data in the design of sports products.



Sports Data and Internet of Things

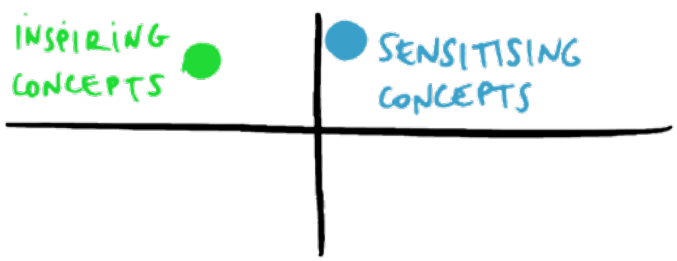
Are you challenged in sensitidsing what technology may or may not be gainful or can enhance athletes' actions to learn, perform or engage more pronounced in their sports experience? Consider the pros and cons of inspiring the IoT and big-date use in your sports solution.

Generating Questions or Proposals

- What sensors are needed, and what do they affect? – Try using the method of Sensing Through Object.
- Is the technology a thing you wear or an object you will be manipulating? Will it run on a phone? Will it be part of the environment?
- What will people be able to do with the technology that they could not do otherwise?
- Does the technology support value and sports activities, or is it in the way of the activity?

Modifiers

- Basic Movement, Training Element, Play & Sports Discipline, Play Element, Persona, Logic, Stance & Value, Role & Perspective, Environment, Technology, Game Structure.



Sports and Movement Technologies

A Framework for Exertion Games

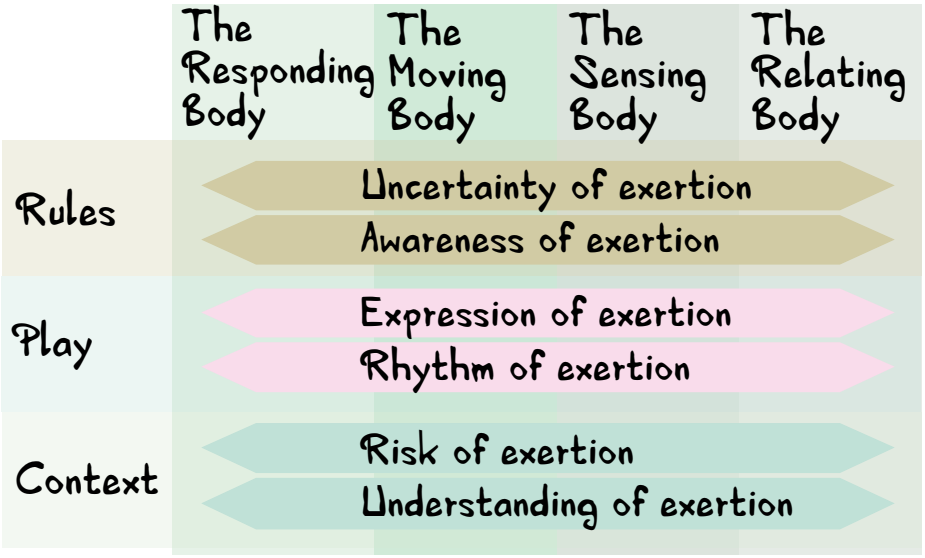
Movement-based Design Methods often capitalise on the cultural conditions of play to foster creativity and social connectedness in sports and movement.

Multiple knowledge sources related to play behaviour and game design thus become relevant in creating and analysing such methods.

Researchers have not agreed to define play, though it is often described as unproductive, free and voluntary, uncertain, separate, make-believe and governed by rules. Several theories and design knowledge is also related to exergame design.

The Exertion Game Design Framework (EGDF) is one such theory that includes four distinct body perspectives integral to creating physically demanding games: the responding body, the moving body, the sensing body, and the relating body. The EGDF second dimension emphasises the importance of rules, play, and the context in game design.

The framework was developed by Floyd Mueller, who also created the Exertion Game method card for generating and refining exertion games.



A Framework for Exertion Games

As an exergame designer, do you need an understanding of different play, sports, and movement perspectives? We recommend you guide your movement game solution design using the exertion game framework that covers angles of responding, sensing, moving, and relating body and rules, play, and context angles.

Questions and Proposals

- Generate a variety of gameplay using the method Generate Games from Play and choose between:
  1. uncertainty or awareness of exertion.
  2. an expression of exertion or the rhythm of exertion.
  3. a variety of gameplays with risk of exertion or with an understanding of exertion.
- Which of the four body perspectives is in focus for your game? What do your test data provide for insights into your players' experience?

Modifiers

- Movement Perspective, Play Elements, Play Perspective, Persone, Technology, Game Genre, Game Structure, and Game Mechanics.

Sports and Movement Technologies

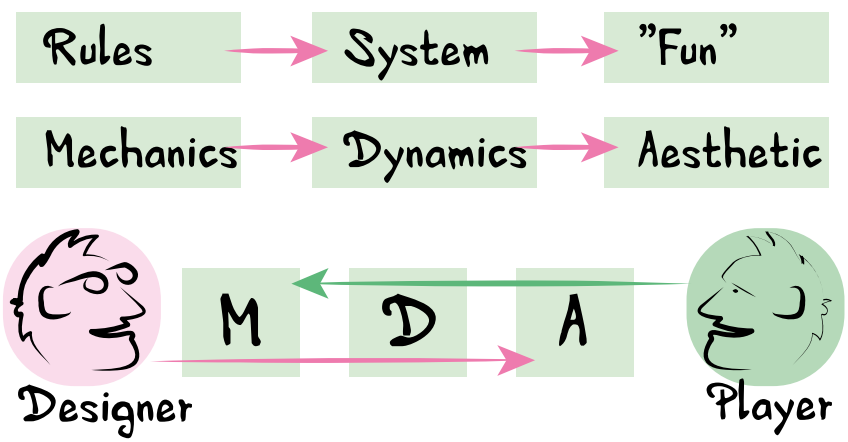
The MDA game framework

Mechanics, Dynamics, and Aesthetics (MDA) is an approach to understanding games or studying exergames, physical activity games and game design. The MDA framework recognises the different perspectives designers and players have on a game and breaks down the consumption of games into three MDA pieces.

The content of games is related to the behaviour of the players. Mechanics describe the components of the games; Dynamics describe the outcome of a player's input; Aesthetics describe the desirable emotional response evoked in the player interacting with the dynamics. Aesthetics can be:

1. Sensation: Game as sense-pleasure and 'fun'
2. Fantasy: Game as make-believe
3. Narrative: Game as drama
4. Challenge: Game as an obstacle course
5. Fellowship: Game as social framework
6. Discovery: Game as uncharted territory
7. Expression: Game as self-discovery
8. Submission: Game as a pastime.

Dynamics create the aesthetic experiences, e.g., time pressure for creating a challenge game. Dynamics are built on top of mechanics.



The MDA game framework

Are you challenged designing exertion games? The MDA framework breaks down the consumption of the game into three pieces, Mechanics, Dynamics and Aesthetics (MDA). And the content of games is related to the behaviour of the players.

Questions and Proposals

- What movements will your game create, are these aligned with the component of aesthetics? Method: Explore Movement.
- Change the mechanics and dynamics to make the game based on your movement insights. Method: Generate Games from Play.
- What is the desired emotional response from players participating in your game? Method: Generate Movement from Imagery.
- How are your players experiencing the Mechanics, Dynamics and Aesthetics of the exertion game? Method: Video or Photo Sketch.

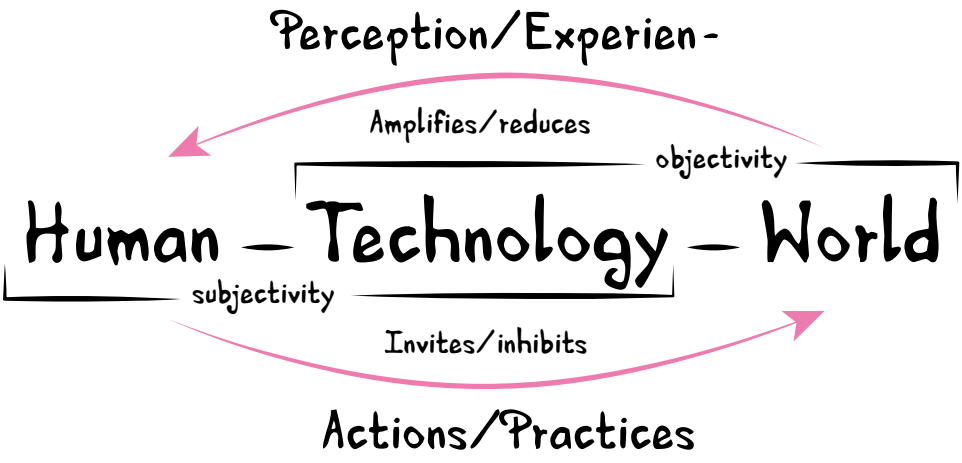
Modifiers

- Basic Movement, Movement Perspective, Play Elements, Play Perspective, Logic, Stance & Value, Technology, Game Genre, Game Structure, and Game Mechanics.

Sports and Movement Technologies

Post Phenomenology

Postphenomenology is a philosophy that has also recently started to impact movement technology design research. It stresses that technology is not neutral but instead influences certain aspects while diminishing others. Post-phenomenology is based on Husserl's notion of "phenomena" but argues that objects and subjects shape each other and can't be analyzed independently. The philosophy views artefacts as actors that deserve to be studied along with humans. Postphenomenology recognizes small ranges of possible technology relations, such as embodied (acting through technology) and hermeneutical (technology shaping our interpretation of reality). However, it acknowledges that technology relations are multistable and changes over time. The philosophy encourages a holistic analysis that prioritizes the interrelation of technology and use. In design, it emphasizes the need for an iterative process that includes the interaction between humans and acting things. Studies highlight the importance of measuring bodily interactions in an unobtrusive way over a more extended period.



Post Phenomenology

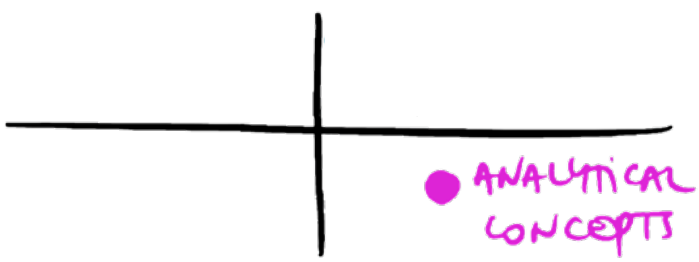
You probably know that humans create technology. Have you considered that technological artefacts are viewed as actors and shape or create humans? You may use postphenomenology to analyse the multistable movement-technology-human relations that change over time.

Questions and Proposals

- Empathise with your target athlete to generate insights into their world of technology use. Method: Sensitising Designers and Sensing Through Object.
- Try to generate movement ideas (embodiate) by acting out various movements influenced by your environment, the social relations with which you collaborate, and multiple technologies. Method: Embodied Sketching.
- How does your test data provide meaningfulness to the user's world of technology use? Method: Strong Prototyping.

Modifiers

- Training Element, Play & Sports Discipline, Play Element, Play Perspective, Persona, Role & Perspective, Impairment, Environment, constraints, Logics, Stances, & Values, Technology.



Sports and Movement Technologies

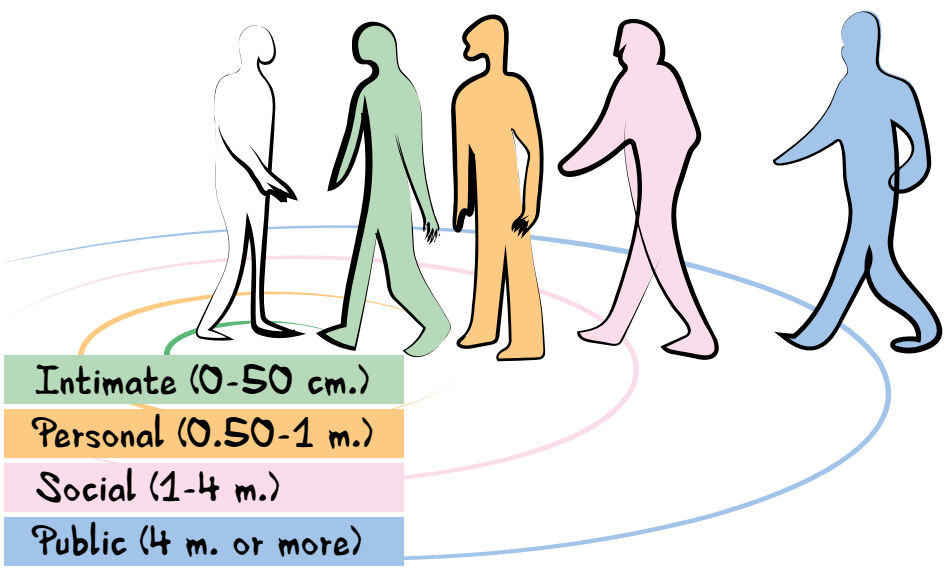
Proxemics

Proxemics divides the space around individuals into intimate, personal, social, and public zones.

The personal space size can vary based on environment, culture, gender, age, relationship, and personality. It also studies the orientation of groups in a social setting, such as their facing formations and how they share a transactional space.

Actions that happen in that space influence how people act towards others. It is often described as a bubble – it has been described as having a circular/spherical or elliptical shape. The space changes contingent on the environment (e.g. room size, spatial layout, lighting conditions....), culture (some cultures have smaller personal spaces), gender and age (e.g. increases with age), relationship, and personality.

The orientation of a group can impact joint action and communication. Proxemics is used in the design of interactive systems and is explored by designers and users through physical testing of actions, movements, gestures, etc.



Proxemics

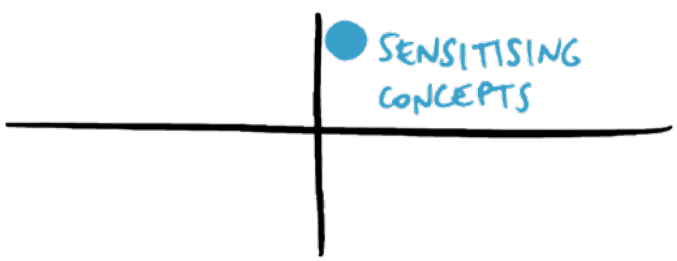
Are you puzzled by what distances from other people do to your use of technology? Proxemics theory is ideally suited for movement-based design. You can sensitise this by dividing the space around individuals into intimate, personal, social, and public zones. Proxemics studies also look into how spaces are shared and not shared.

Questions and Proposals

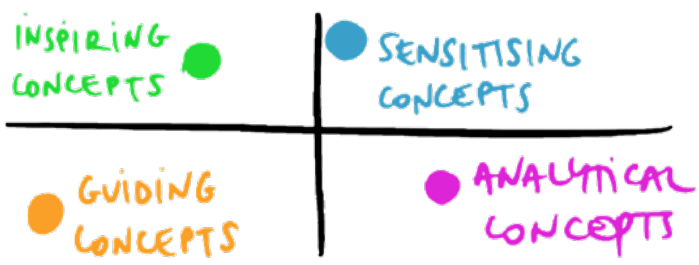
- Experience how movement technologies affect physical activity in the four proxemics zones: intimate, personal, social, and public. Method: Empathy in Action.
- Movement ideate your solution for playing or doing sports in the four zones: intimate, personal, social, and public. Method: Explore Movement and Soma-Slowstorming.
- Observe and describe how human interaction occurs between people and between people and your test movement technology solution. Method: Forum Theatre.

Modifiers

- Movement Perspective, Training Element, Persona, Role & Perspective, Logic, Stance & Value, Environment, Constrain, Technology.



Sports and Movement Technologies

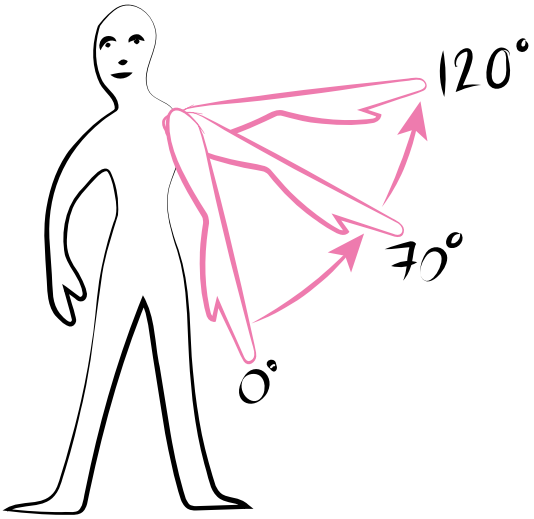


39 Movement Concept

Mental Body Representations

The Mental Body Representations (MBR) theory contains how our mind perceives and stores information about our body, including its appearance, configuration, and motor abilities. These mental representations are constantly updated based on sensory input from our environment and play a crucial role in interacting with objects and people. MBR allows us to keep track of our body parts and how they change in space and is closely linked to our self-esteem and self-identity.

MBR can be divided into body image, which is conscious and includes our attitudes towards our body, and body schema, which is subconscious and includes our body's motor abilities. Conflicts between sensory inputs can induce changes in MBR, leading to changes in our perception of our body and its relation to others. We can use the MBR theory to understand how to enhance body awareness and improve physical and emotional states by providing sensory feedback about the body. E.g., sound feedback about the distance to a target posture can improve movement and increase self-efficacy.



1. Calibration
2. Training
3. Experiment (1, 2, & 3)
4. Questionaires

Mental Body Representations

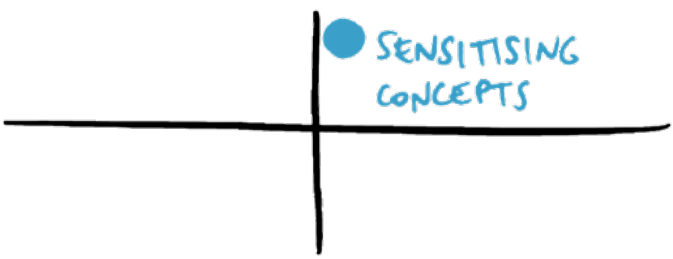
Have you sensitised how our brain perceives and stores information about our body, such as appearance, configuration, and motor abilities? These Mental Representations (MBR) are divided into body image and body schema. An outside explicit vs an inside implicit approach to your body.

Questions and Proposals

- Try sensitising how your user's mind or yours perceives body appearance, configuration, and motor abilities. Methods: Collaborative Somatic Inquiries, Sensing Through Object.
- Try movement ideate using the MBR, technologies, or feedback that uses data from body representations. Methods: Soma-Slowstorming, Generate Games from Play.
- Test your movement solutions from an MBR perspective and observe your users' experiences or behaviour. Methods: Forum Theatre, Video or Photo Sketch.

Modifiers

- Logic, Stance & Value, Basic Movement, Game Structure, Game Mechanics, Play Perspective, Play Element, Play & Sports Discipline.



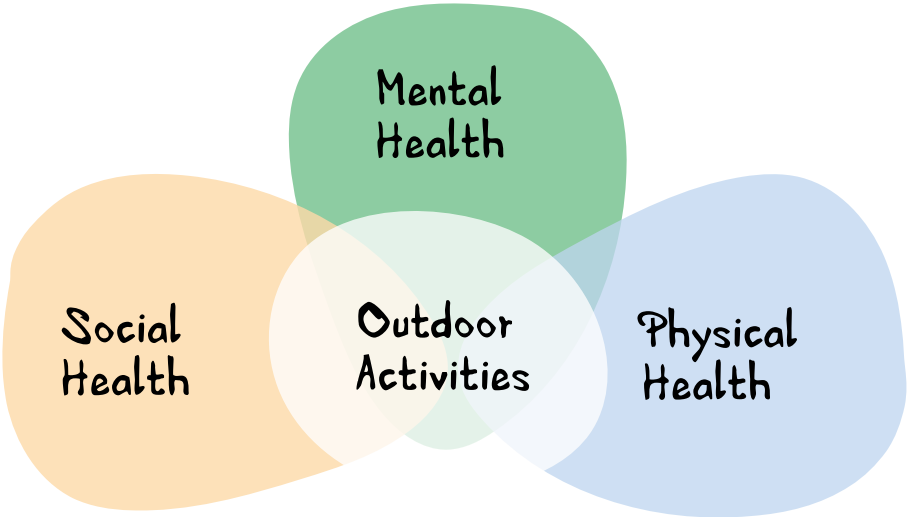
Understanding Psychology of Humans

Movement Concept

Outdoor Physical Activity & Health

When studying physical activity in the domain of technology, design, movement and health, using environments is an important concept to consider. Physical activities in the setting of nature, such as horse riding, walking, cycling and fishing, are positive for physical health but also correspond with an improvement in self-esteem and total mood disturbance Pretty et al. (2007). A review study has compared the effects of exercising indoors with those of exercising in natural environments. The results indicated that exercising in natural environments was associated with greater feelings of revitalisation and positive engagement, as well as a decrease in tension, confusion, anger, and depression, and an increase in energy when compared to exercising indoors.

When considering the domains of play, sport, technology, and health, it is valuable to consider the perspective of outdoor living and nature to promote well-being and physical activity. Being in a natural environment when doing physical activities can contribute to overall feelings of well-being.



Outdoor Physical Activity & Health

How can we design to appreciate the variety of movement opportunities in nature? Consider how nature and outdoor activities are health-promotion, stress-reducing, and healing. Allow your participants to explore and develop their technology for outdoor revitalisation and positive engagement.

Questions and Proposals

- Sensitise with your outdoor environment and empathise with your end-users by moving in their preferred outdoor context. Methods: Sensitising Designers, Empathy in Action.
- Movement ideate by playing out different outdoor scenarios with various technologies. Methods: Soma-Slowstorming, Explore Movement.
- Analyse your user's test data moving along with the end-users regarding the quality of their outdoor life and physical activity. Methods: Context Playing, Video or Photo Sketch.

Modifiers

- Basic Movement, Movement Perspective, Play Element, Metaphor, Logics, Stances & Values, Persona, Environment, Impairment, Constraint, Technology.

Understanding Humans in Society

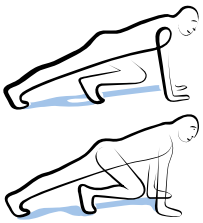
Movement Concept

High Intensity Interval Training – HIIT

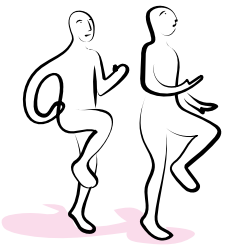
High-intensity interval training (HIIT) is an interval training strategy that involves short periods of high-intensity movements followed by periods of lower intensity. While improvements in endurance performance are evident in sedentary and recreationally active groups following submaximal endurance training, an additional increase in training volume in highly trained individuals does not appear to enhance endurance performance or associated physiological variables. HIIT may be the only way to improve endurance performance for already-trained athletes. Studies on HIIT program optimisation in cyclists suggest that repeated supramaximal sprinting may be equally effective.

HIIT also improves functional capacity and quality of life in patients with chronic diseases like cardiovascular and pulmonary disease and type 2 diabetes. HIIT is at least as effective in patients with pulmonary diseases as moderate continuous training (MCT). HIIT presents little risk to stable patients who follow prescribed exercise protocols.

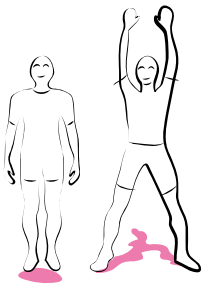
Plank hold



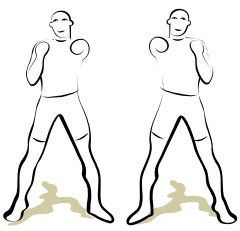
Klimbers



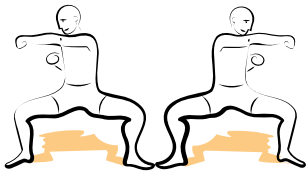
High knees



Jumping jacks



Punches



Squat hold punches

High Intensity Interval Training – HIIT

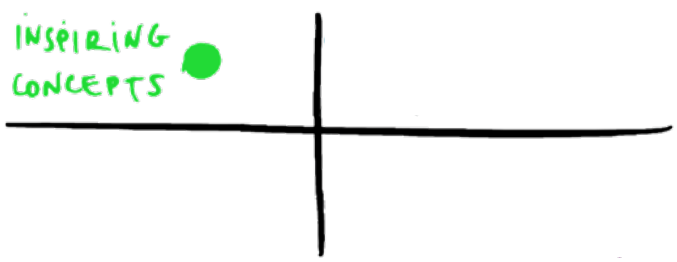
You have probably heard about HIIT. It is a highly effective training form often used in CrossFit training and will benefit several physiological parameters. If you are designing exercise solutions for elite athletes or patients rehabilitating chronic diseases, you could positiviely beinformed by HIIT concept.

Questions and Proposals

- Go along with your users to sensitise doing High-Intensity Interval Training with them. Method: Collaborative Somatic Inquiries.
- Make sure to find an intensity that fits you.
- For your design, try to act out a variety of movement ideas that are based on HIIT. Method: Explore Movement, Bodystorming.
- Is HIIT a relevant characteristic of the activity you are designing for? Method: Embodied Storming.
- How are your users experiencing the HIIT solution? Method: Strong Prototyping.

Modifiers

- Basic Movement, Movement Perspective, Training Element, Environment, Persona, Impairment, Constrain, Technology.



Physical Training and Physiology

Movement Concept