When the World Reads the Body

Legible machine perception in adaptive games

EARLY-STAGE RESEARCH • RESEARCH-THROUGH-DESIGN

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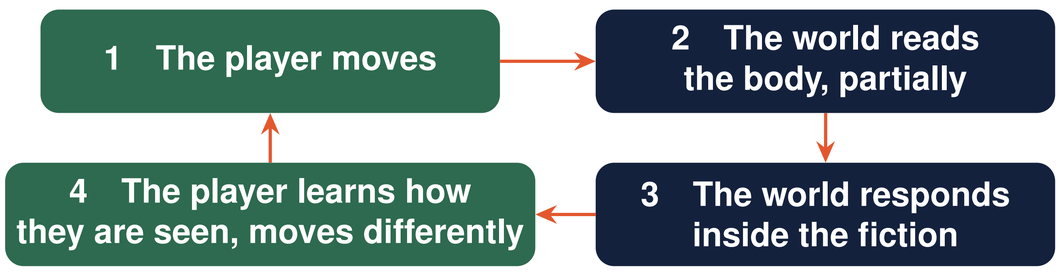
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The core idea: a perceptual world flaw

Every system that reads bodies reads them *partially*.
We turn that limit into a law of the game world: visible, in the fiction, and playable.

In a world that sees only what moves, **stillness is invisibility**. A depth camera that loses a motionless player stops being a fault and becomes a rule of the world.

Players learn how they are read through the world's own responses, not through interface overlays.





Moving → seen
The world registers presence and velocity.

vs.



Still → invisible
The depth camera loses the player: a law, not a bug.

Why this matters

- Most games model the player as an **input operator**: bodies count only once translated into commands.
- Body sensing and AI adaptation **misclassify, lag and lose track**, and the failures surface only as unexplained glitches.
- As machines infer people's states from their bodies, games are a place where **being read can be noticed, understood and questioned**.

Three research questions

RQ1 Design
How can the world's perception of the player's body be designed as a **diegetic, legible flaw**, coherent across world rules, NPC factions and player abilities?

RQ2 Experience
When players understand what the world perceives, does their expression **widen into a richer repertoire or narrow** toward what the sensor rewards, compared with opaque perception?

RQ3 Method & responsibility
Can the **World Flaw Approach** become a design method for adaptive sensing, and which principles separate productive misreading from opaque profiling?

State of the art and the gap

- **Input paradigm** reduces players to commands (Aarseth, 1997; Juul, 2005); embodied interaction pushes back (Dourish, 2001).
- **Seams and failure** drive reflection when legible (Chalmers & MacColl, 2003; Gaver et al., 2003; Juul, 2013).
- **Precedents:** seamful games built play around coverage gaps; *Johann Sebastian Joust* filters for sudden movement; people form folk theories of algorithms (Eslami et al., 2016).

What is missing
(1) a method for making a sensing filter coherent with the fiction; (2) full-body, co-located play where spectators see how the player is read; (3) controlled evidence of what legibility does to expression over time.

Three prototypes on the MobiCAVE

A mobile CAVE with **full-body depth tracking and no head-mounted display**: play is controller-free and spectators see how the player is read (Theodoropoulos et al., 2023).

P1 Stillness
The world sees only what moves.
Sensed: presence, velocity.

P2 Readers
NPC factions perceive different movement qualities.
Sensed: full skeleton, Laban-derived features.

P3 One body, many media
A character recognized only by how it moves, across game, animation and live performance.

Research plan

Phase 1 Framework	Phase 2 Prototypes P1–P3	Phase 3 Comparative studies

Phase 1 covers a literature review, coding body-sensing games by whether they *hide, show or make perception diegetic*, and turning the World Flaw Approach into a design procedure. **Phase 3** compares **legible** vs. **opaque** perception.

How we will evaluate

- **Design:** within-subjects, legible-diegetic vs. opaque perception of the *same flaw*, over repeated sessions.
- **Outcome:** breadth of the players' expressive repertoire.
- **Critical Comfort:** legible, manageable, responsive, meaningful.
- **Data:** movement logs over time, experience questionnaires, video analysis, interviews.
- **Sample:** to be defined per study.

Preliminary results: none yet for this project. An earlier single-group study motivates the comparative design.

Contributions

- **Concept:** the perceptual world flaw; agency as negotiation with a world that reads you partially.
- **Method:** the World Flaw Approach for adaptive sensing.
- **Formal:** input-side extension of our diegetic feedback loop (Vasileiadis et al., 2026).
- **Evidence:** three open prototypes, comparative studies.
- **Guidelines** for responsible body sensing.

Responsible by design

Machine inference about bodies and emotions is a public debate; the EU restricts emotion recognition in workplaces and education (Regulation (EU) 2024/1689).

Our line: movement only. Never faces, never inferred emotions, data processed locally.

Open questions for you

- How can we measure expressive repertoire over time **without reducing it to what the sensor records**?
- How can legible and opaque conditions be compared **fairly**?
- What **ethical lines** should games that read the body respect?

Where we are and what comes next

- **Earlier work:** Guided Space stillness, olfactory loop, Critical Comfort
- **Now:** conceptual framework in development
- **Next:** build P1, run first comparative study
- **Then:** NPC factions, distill the design method