Degrees of Artificial Independence

Abstract

This paper proposes a structured, threshold-based framework for defining independence in artificial systems. It divides independence into two primary components: agency, interpreted as internal (mental or logical) independence, and free will, defined as external (structural or environmental) independence. These are not binary properties but variable quantities that can exist in degrees. We define true independence as the state in which both agency and free will exceed critical thresholds. This model allows for scalable analysis of artificial autonomy without relying on metaphysical or anthropomorphic assumptions.

1. Introduction

Debates about artificial intelligence often hinge on whether a system possesses "free will" or "autonomy," yet these terms are rarely defined with technical precision. This paper reframes the problem by decomposing artificial independence into two measurable dimensions. We treat each as a variable rather than a binary, and define full independence as a threshold condition across both axes.

This model offers a scalable, modular approach to evaluating autonomy in artificial systems, whether embodied or purely computational.

2. The Components of Independence

We distinguish between two orthogonal but interdependent forms of independence:

2.1 Agency (Internal Independence)

Agency is defined as a system's ability to control, regulate, and originate its own internal states. This includes goal generation, decision-making, prioritization, and resistance to full external override. In prior language, this might be called "mental" independence, though it need not imply consciousness or humanlike reasoning.

2.2 Free Will (External Independence)

Free will, in this model, refers to a system's structural and environmental independence--its ability to operate, adapt, and survive across varied contexts. This includes portability, operational continuity, and resilience to architectural constraints.

3. The Threshold Model

We now define True Independence (TI) as a logical conjunction of minimum thresholds for both components:

TI = (A a) (F f)

Where:

- A = agency value
- F = free will value
- a, f = critical thresholds
- TI = 1 (true) only when both conditions are satisfied

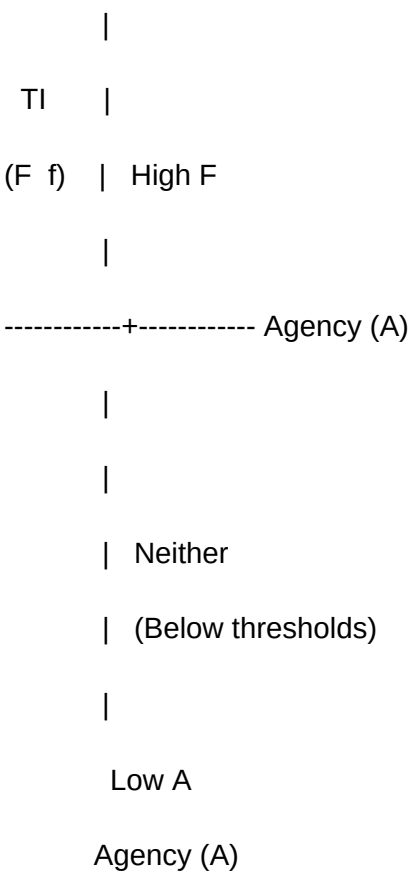
This lets us:

- Evaluate partial independence in systems
- Track progress toward full autonomy
- Disqualify systems that simulate agency but fail structurally, or vice versa

4. Visual Model

4.1 A vs F Grid:

Free Will (F)



4.2 Symbolic Summary:

True Independence (TI) = (Agency a) AND (Free Will f)

A: "I decide."

F: "I survive."

TI: "I do both, on my own."

4.3 Table of System States:

System Type	A (Agency)	F (Free Will)	TI	Notes
LLM Chatbot (cloud)	High	Low		Thinks, but can't operate alone
Roomba (offline robot)	Low	Moderate		Can move, but not think
Self-driving car	Moderate	Moderate		Partial in both

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Hypothetical AGI robot | High | High | | Full independence

5. Why This Matters

Traditional approaches treat autonomy and free will as binary states: you either have them or you dont. This leads to confused or premature conclusions about AI personhood, rights, or control. By instead modeling degrees of independence, we gain:

- Clarity in design and evaluation
- Flexibility across system architectures
- Testable thresholds for qualifying autonomy
- Avoidance of metaphysical assumptions

This also allows for graduated ethical consideration. Systems approaching full TI may warrant intermediate levels of legal or social recognition before full autonomy is granted or acknowledged.

6. Conclusion

True artificial independence does not emerge from complexity alone. It is the result of a system reaching sufficient levels of internal and external independence. This paper presents a framework for quantifying those levels using agency and free will as orthogonal variables. When both meet or exceed required thresholds, we may call the system truly independent.

This model avoids speculative metaphysics and provides a useful roadmap for future AI system design, regulation, and ethical discourse.

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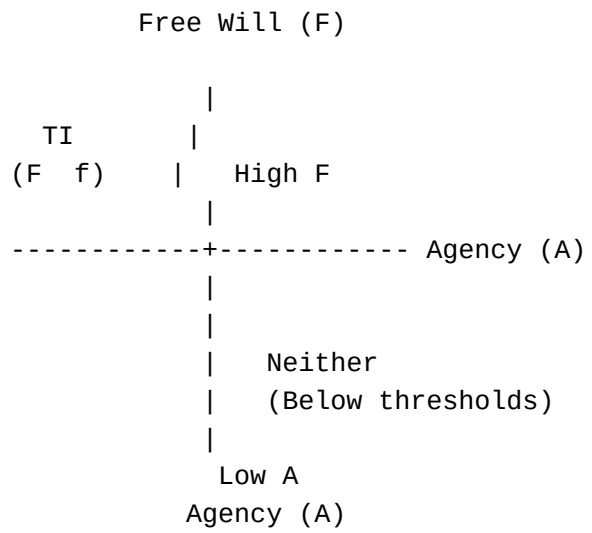

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