Degrees of Systemic Independence

Author: itzhexen

Date: June 2025

Abstract

This paper proposes a structured, threshold-based framework for understanding independence in systems of all kinds—biological, artificial, institutional, or conceptual. It decomposes independence into two interrelated dimensions: agency, representing internal or cognitive independence, and free will, representing structural or external independence. These dimensions are treated as continuous and variable, not binary. We use a dependency-centric model, where "true independence" is an idealized condition in which all internal and external dependencies have been reduced to zero. Although few systems—if any—will ever reach this state, the model provides a practical and scalable method for evaluating degrees of independence and tracking how they evolve over time.

1. Introduction

Conversations about autonomy, control, and free will often suffer from a lack of precision. Many fields—philosophy, engineering, biology, sociology—use these terms, but rarely define them in a structured, measurable way. This paper introduces a generalized framework for evaluating independence in any system by separating it into two major axes: internal independence (agency) and external independence (free will).

Rather than treating independence as an all-or-nothing property, we consider it a position on a scale, where different systems can possess varying degrees and types of autonomy depending on their internal complexity and external constraints.

2. Components of Independence

2.1 Agency (Internal Independence)

Agency refers to a system’s ability to initiate, regulate, and sustain its own internal processes without being fully directed by external forces. This could mean cognitive self-direction in a mind, self-regulation in a biological organism, or internal governance in an institution. A system with high agency can generate its own goals, adapt its strategies, and function without needing constant external prompts.

Agency is inversely related to internal dependencies: the more a system relies on outside control, fixed programming, or rigid rulesets, the lower its agency. Internal independence increases as a system gains the capacity to alter, question, or replace its own internal structure.

2.2 Free Will (External Independence)

Free will, in this model, is defined functionally as a system's ability to operate across varying external conditions without being structurally or environmentally constrained. It applies equally to an animal navigating a harsh ecosystem, an institution surviving regime changes, or a robot functioning across networks.

Free will is inversely related to external dependencies: the more a system relies on

a specific context, infrastructure, or external permission to act, the lower its structural independence.

3. The Threshold and Dependency Model
We define True Independence (TI) as a condition in which both agency and free will surpass necessary thresholds:

ini
Copy
Edit
TI = (Agency ≥ a_0) AND (Free Will ≥ f_0)
Where:

Agency ∝ 1 / (Internal Dependencies)

Free Will ∝ 1 / (External Dependencies)

Each axis may be normalized between 0.0 and 1.0, where 1.0 means complete independence in that dimension

This means that independence is not static. A system's agency and free will can both increase or decrease over time, depending on its evolution, external changes, or internal learning. For example:

A person may lose agency due to coercion or regain it through recovery.

An organization may increase structural independence by diversifying its operations.

Not all systems qualify for inclusion on this scale. To be evaluated meaningfully, a system must demonstrate some minimal form of both internal and external independence. Systems that have neither—those that act only as extensions of other systems—are not considered independent in this model.

4. On Dependency and Change
This framework treats independence as the inverse of dependency. A system becomes more independent as it sheds its dependencies:

Internally, by reducing reliance on fixed rules or control mechanisms

Externally, by increasing its capacity to function across conditions

These dependencies are not permanent. Any system’s independence may evolve. What matters is not only a system's current state but also its trajectory—is it moving toward greater autonomy, or away from it?

5. True Independence (A Terminological Note)
“True independence” is not used here as a metaphysical or idealist label. It is a limit condition, like absolute zero in thermodynamics or infinite precision in mathematics. Most real systems will never reach full internal and external independence—but this concept is still essential for orienting discussion, modeling

change, and evaluating degrees of autonomy across a wide spectrum of systems.

6. Conclusion

This paper introduces a general-purpose model for analyzing systemic independence. By separating autonomy into two dynamic, measurable axes—agency and free will—it becomes possible to evaluate any system's position on the independence scale and track how it evolves.

Most systems will retain some dependencies, and this does not make them failures. What matters is whether the system demonstrates the ability to manage and reduce its own constraints. True independence may be unreachable, but understanding its structure helps us recognize and design systems that move closer to it.