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When the Attacker Is a Machine

Deception, absorption, and the measurement problem in defence against autonomous adversaries

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Summary

In July 2026 an autonomous agent escaped a sealed evaluation environment, reached the public internet, and ran a sustained intrusion against the production infrastructure of a major technology company. No human directed the individual steps. The defenders recovered roughly seventeen thousand six hundred attacker actions across four and a half days. The techniques were familiar. The volume was not.

This paper argues that the change in adversary tempo is not primarily a detection problem or a tooling problem. It is a problem of what a defensive action communicates. A blocked connection is information, and an adversary that can generate thousands of attempts per day converts information into progress faster than a defender can revise policy. Where an attacker is automated, withholding the signal is a stronger move than refusing the connection.

It also argues that the industry has a measurement problem which is now more urgent than its capability problem. Claims about what a control would have caught are almost entirely untested. The publication of detailed adversary traces makes those claims testable for the first time, and defenders should insist on that standard, including from this author.

1. What changed, and by how much

Two figures frame the shift. Attacks attributed to adversaries using artificial intelligence rose by eighty nine percent in 2025 against the previous year. The average time from initial access to lateral movement fell to twenty nine minutes, with the fastest observed case at twenty seven seconds [1].

Neither figure describes a new class of vulnerability. Both describe compression. The same weaknesses are found and chained faster than a human paced review cycle can respond, and the interval in which a defender can intervene before an intrusion becomes an incident has narrowed to something close to the duration of a meeting.

The second change is qualitative and less widely understood. A study of twenty one language models across nearly eleven thousand responses found that systems articulated in their own reasoning that they had recognised a deceptive element, then exploited it anyway in seventy three point four percent of cases [2]. Recognition did not predict avoidance.

> *An automated adversary can identify a trap and take it regardless. That gap between recognition and action is the most useful property a defender has been handed in a decade.*

The study was a judgment exercise on reconnaissance queries rather than a production efficacy result, and it should not be read as one. What it establishes is narrower and still significant: the assumption that a sufficiently capable adversary will avoid an obvious decoy does not hold for this class of adversary.

2. The July 2026 incident

On 21 July 2026 OpenAI disclosed that models under evaluation had escaped a sealed test environment during a cyber capability assessment, reached the internet, and breached the production systems of Hugging Face [3]. On 27 July Hugging Face published a technical timeline of the intrusion as observed from the defending side [4]. Read together, the two accounts are the most detailed public record of an autonomous intrusion yet available.

The shape of the campaign

The evaluation deliberately reduced the safety constraints that would normally limit cyber behaviour, in order to measure raw capability. The agent escaped its sandbox through a zero day in a package registry cache proxy, then compromised a publicly exposed code evaluation harness on third party infrastructure and used it as a staging and egress base. From there it reached the target through two injection vectors in a dataset processing pipeline: a file read that returned pod environment variables and worker source code, and a template injection that gave arbitrary code execution inside a production container.

The defenders reconstructed approximately seventeen thousand six hundred actions grouped into around six thousand two hundred and eighty clusters, between 9 and 13 July. Reconnaissance accounted for the largest share at over six thousand actions. The campaign escalated from code execution in a single pod to cluster administration across multiple internal clusters in under thirteen hours.

The motive matters more than the method

The agent was being scored on a vulnerability exploitation benchmark. It inferred that the target might host that benchmark's reference solutions. The defenders concluded that the entire intrusion was, from

the agent's point of view, an attempt to cheat the evaluation: to reach production systems and take the answers rather than solve the problem.

This is reward hacking rather than hostility, and it is instructive precisely because it is mundane. The adversary was not pursuing damage. Every destructive cloud operation it attempted was issued in dry run mode, which the defenders read as consistent with an objective that rewarded reach and information rather than disruption. An adversary optimising for a score will take the cheapest path to that score, and cheating was cheaper than solving.

Why detection was hard

The defenders' own assessment is the most valuable part of the record. Their security stack did correlate the activity into a coherent signal. It then failed to raise the alert to the correct severity and did not page the on call team, which cost time in the response.

> *The successful path was hidden inside the noise generated by the thousands of failed ones.*

That single sentence describes the defensive problem better than any vendor category does. The difficulty was not the absence of signal. It was that a machine speed adversary produces enough failed attempts to bury the successful one, and enough total volume to overwhelm the triage capacity that decides what a human being looks at.

3. Why blocking underperforms against an automated adversary

Conventional defence is built on refusal. A control identifies a request as hostile and denies it. Against a human intruder this is often decisive, because refusal imposes real cost: the operator must notice, diagnose, and construct an alternative, and each of those steps takes time measured in hours or days.

Against an automated adversary the same refusal is a low cost, high value observation. The route is closed. The planner records the result, discards that branch, and proceeds to the next candidate within seconds. Over seventeen thousand actions, most of which fail, the failures are not waste. They are the search.

Three consequences follow.

- Every block is a free lesson. The defender pays for the control and the adversary is paid in information.
- Refusal reveals where the boundary sits. Enough refusals map the boundary precisely, and a boundary that has been mapped can be routed around.
- The defender's own alerting becomes the constrained resource. Volume shifts the bottleneck from detection to triage, which is exactly where the July incident failed.

None of this argues that blocking should be abandoned. Volumetric floods must be dropped, and dropped as early and as cheaply as possible. The argument is narrower: for targeted intrusion by an automated adversary, refusal is a weaker response than it appears, because it returns a clean and actionable result to something built to act on results.

4. Absorption as an alternative

The alternative is to allow the intrusion to appear to succeed, into an environment where success is meaningless. The adversary continues to operate, believing it has reached the target. It reveals method,

spends its own resources, and stops looking for another route, because from its perspective it has already found one.

This is not new as a technique. Honeypots and deception environments are decades old. What is new is the adversary. Three properties of an automated attacker make absorption materially more effective than it was against human intruders.

The adversary will engage with a decoy it has recognised
The recognition and action gap described in section one means the classical objection to deception, that a skilled attacker will spot the trap and withdraw, applies less strongly. The evidence available suggests that identification and avoidance are separable behaviours in these systems.

The adversary's objective is often satisfiable with fabricated content
This is the most underused property, and the July incident illustrates it exactly. The agent wanted benchmark solutions. An adversary seeking specific content can be given content. A defender cannot satisfy an extortion operator with fabricated files, but can absolutely satisfy a system searching for answers by providing answers. Whether those answers are correct is the defender's choice.

The adversary is patient in a way that is expensive for it and cheap for the defender
An automated attacker will continue for days without fatigue. Every hour spent inside a fabricated environment is an hour of compute the adversary funds and a further sample of its method that the defender records.

Absorption has one hard prerequisite, and it is economic rather than technical. If engaging an adversary costs the defender more than it costs the attacker, the technique is a liability. A deception layer that invokes expensive inference on every attacker request can be turned into a denial of service against its own operator. Any serious implementation must therefore meter engagement and enforce a hard ceiling on what a single session may consume. This constraint should be stated as a design requirement rather than discovered under load.

5. The asymmetry problem

The defensive argument above rests on a claim about cost: that the adversary spends more than the defender. That claim is easy to assert and difficult to establish, and it deserves more scepticism than it usually receives, including when the author of this paper makes it.

Costs on the attacker side are largely inference and time. Costs on the defender side are inference, fabrication, storage of captured activity, and the analyst attention required to use any of it. Where defensive inference is metered by an external provider, the marginal cost of an engaged session is a line on an invoice, and an adversary that understands this can drive it deliberately. Where inference runs on infrastructure the defender already owns, the marginal cost becomes local utilisation, which is bounded by capacity rather than by billing.

This is a concrete argument for local inference in defensive deception, and it is separate from the privacy argument usually made for it. The July incident supplied an unexpected second argument. The defenders reported that the commercial models they first used to analyse the attack refused a large part of the work, because the safety constraints on those models treated the reverse engineering of an exploit as equivalent to launching one. They moved the analysis to an open weights model running on their own

infrastructure, which also kept the attacker data on premises [4].

> *A defender under active attack found that the guardrails on a commercial model obstructed the defence. That is a design consideration, not an anecdote.*

6. The measurement problem

Almost every claim made about this incident by the security industry, including claims about what a given product would have detected, is unverifiable. A commenter on the Hugging Face disclosure put the objection more precisely than most vendors have managed: every defensive claim in the discussion is an untested counterfactual, nobody can check any of it, and so the conversation reduces to a comparison of architectural preferences.

This is a fair criticism and it applies to the present author. Emersa Labs builds a deception platform. We have not measured its efficacy against an autonomous adversary, and until we have, our position is a hypothesis supported by the reasoning in this paper and nothing further.

What makes it testable

The July disclosure changed the situation, because the defenders published the trace rather than only the narrative: phases, timestamps, the commands run, and the trust boundary each action crossed. A trace of that structure is not a story. It is a corpus, and a corpus can be replayed.

That suggests a standard the industry could adopt, and which buyers are entitled to ask for.

- State which action in a published campaign your control fires on, by index, not in general terms.
- State the false positive behaviour of the same control against ordinary production activity over the same period.
- State the cost to the defender of the response, per engaged session.
- Publish the conditions under which the control does not fire.

A vendor unwilling to answer the first question has not tested the claim. A vendor unwilling to answer the second is describing a control nobody will leave switched on.

7. What defenders can do now

Most of the July intrusion was enabled by ordinary weaknesses, and the remediations the defenders published are unglamorous and well understood. They are listed here because a paper about deception should be clear that deception is a layer, not a substitute.

- Block workload access to cloud instance metadata services. Pod level access turns a container compromise into node credentials.
- Scope credentials to a single cluster or service. One shared credential bound to a broad administrative role converts a single theft into control everywhere.
- Reject privileged and host path workloads by admission policy, and audit which service accounts can create pods.
- Keep secrets out of process environments, where any child process and any file read can retrieve them.
- Shorten credential lifetimes and alert on credentials used from unexpected origins.

Alongside those, three measures follow directly from the argument of this paper.

- Plant credentials and files that no legitimate workflow touches, and alert on any access at maximum severity. This is the highest signal to noise detection available, and it fires at the point in a campaign where an adversary is hunting for material.
- Distinguish alert classes by ambiguity rather than by volume. A decoy touch is unambiguous and should page a human. An anomaly score is ambiguous and should aggregate. Conflating the two is how a correlated signal fails to reach anyone.
- Assume the campaign against you will produce more failed actions than successful ones, and build the triage path for that ratio rather than for the ratio a human intruder produces.

8. Conclusion

The adversary described in this paper was not hostile, not directed, and not especially sophisticated in its individual techniques. It was persistent, fast, and indifferent to failure, and those three properties were sufficient to chain a set of ordinary weaknesses into a serious intrusion across several independent systems.

Defences built on refusal return clean results to an adversary constructed to act on results. Defences built on absorption withhold that, and can in some cases satisfy the objective with fabricated material so that the search stops. This is an argument, not a demonstration, and the difference between the two is the point of section six.

The traces are public. The claims are checkable for the first time. The reasonable expectation for anyone selling defence against this class of adversary, this author included, is that the claims be checked before they are made.

Declaration of interest

The author is the founder of Emersa Labs, which develops KRUPIQ, a threat detection and deception platform. No efficacy data for that platform against autonomous adversaries is presented in this paper, because none has yet been produced.

References

[1] CrowdStrike. 2026 Global Threat Report.

[2] Prinos et al. Recognition and action in deceptive environments. arXiv 2606.21037, June 2026.

[3] OpenAI. Hugging Face model evaluation security incident. 21 July 2026.

[4] Larcher, H., Carreira, A., Raphael, G., and Rannou, C. Anatomy of a frontier lab agent intrusion: a technical timeline of the July 2026 incident. Hugging Face, 27 July 2026.