



PERSPECTIVAS Y COMENTARIOS

Beyond the categorical museum: a dynamical-systems perspective on DSM-5 autism nosology

Más allá del museo categorial: una perspectiva desde los sistemas dinámicos sobre la nosología del autismo en el DSM-5

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RESUMEN

El DSM-5 sustituyó el síndrome de Asperger por un constructo dimensional del espectro autista, principalmente porque los límites entre subtipos mostraban baja fiabilidad y la distribución de los rasgos era continua. Esta perspectiva sostiene que la nosología resultante puede incurrir en un error categorial: tratar un sistema cognitivo adaptativo complejo como si su identidad se agotara en coordenadas dentro de un espacio de síntomas. A partir del concepto de error categorial de Ryle, el análisis gramatical de Wittgenstein, el programa de Erlangen de Klein, la geometría dependiente de escala de Mandelbrot y la neurociencia de las dinámicas críticas, se distingue entre descripción dimensional y organización dinámica. La severidad sintomática puede constituir una proyección válida, mientras que ciertas configuraciones clínicas podrían caracterizarse mejor mediante atractores, trayectorias y otros invariantes del espacio de fases. El ensayo aplica este marco al constructo histórico de Asperger y propone evaluar firmas dinámicas y longitudinales en futuras investigaciones nosológicas. Se consideran métricas de criticidad, estimaciones de excitación-inhibición, conectividad metaestable y trayectorias del desarrollo. Estas medidas no se presentan como biomarcadores diagnósticos validados; la tesis central es metodológica: los instrumentos psiquiátricos deben juzgarse por su adecuación al tipo de objeto que pretenden clasificar.

Palabras clave: Síndrome de Asperger; Trastorno del Espectro Autista; DSM-5; Filosofía de la Psiquiatría; Sistemas Adaptativos Complejos; Nosología.

ABSTRACT

DSM-5 replaced Asperger's syndrome with a dimensional autism spectrum construct, largely because subtype boundaries were unreliable and trait distributions were continuous. This perspective argues that the resulting nosology may commit a category mistake: it treats a complex adaptive cognitive system as if its identity were exhausted by coordinates in symptom space. Drawing on Ryle's concept of category error, Wittgenstein's grammatical analysis, Klein's Erlangen programme, Mandelbrot's account of scale-dependent geometry, and neuroscience of critical dynamics, the paper distinguishes dimensional description from dynamical organization. Symptom severity can be valid as one projection while clinically meaningful configurations may be better characterized by attractors, trajectories, and other invariants in phase space. The essay applies this framework to the historical Asperger construct and proposes that future autism nosology should test dynamical and longitudinal signatures rather than rely exclusively on cross-sectional checklists. Candidate approaches include critical-state metrics, excitation-inhibition estimates, metastable connectivity, and developmental trajectories. These measures are not presented as validated diagnostic biomarkers; the central claim is methodological: psychiatric instruments should be judged by their adequacy to the kind of object they aim to classify.

Keywords: Asperger Syndrome; Autism Spectrum Disorder; DSM-5; Philosophy of Psychiatry; Complex Adaptive Systems; Nosology.

INTRODUCTION: THE VANISHING

In 2013 a clinical category disappeared by editorial decision. Asperger's syndrome, which had entered the manual only nineteen years earlier ¹, was folded without remainder into autism spectrum disorder ², its name retired, its diagnostic distinctness declared an artifact. The official rationale was twofold and, on its surface, irreproachable. First, clinicians could not reliably distinguish Asperger's syndrome from high-functioning autism; the boundary moved from clinic to clinic, from rater to rater ^{3,4,5}. Second, no natural seam had been found in the data — no zone of rarity, no bimodality, no place where the distribution of traits fell to the floor and rose again on the far side. Where there is no valley, the reasoning ran, there is no mountain. One spectrum, dimensionally continuous, was the honest description ^{6,7}.

It is worth pausing to grant this reasoning its full strength, because the argument that follows earns nothing by meeting a weak version of it. The dimensional camp was not careless, and it was not ideological. It held real cards, and a serious answer must play against the best hand it could have held rather than wish the cards away. The inter-rater unreliability was genuine: measured on the symptom-count criteria then in use, the Asperger/high-functioning-autism distinction was poor ⁴, and the three principal diagnostic schemes — ICD-10, DSM-IV, and Gillberg's — yielded substantially non-overlapping classifications applied to the same cases ³. The empirical continuity was real too: measured along the axes the manual measures, the distribution of traits really does run smooth, with no bimodal trough ^{8,9}. And the social history of the label was not flattering — "Asperger's" had become a marker of distinction sought for reasons that had nothing to do with phenomenology, a looping kind in Hacking's sense ^{10,11}. Confronted with an unreliable, socially inflated category that carved no visible joint in the data, a committee charged with producing a usable manual did the responsible thing on the evidence available to it. Any account that cannot say this plainly has not understood what it is arguing against.

The reasoning is impeccable and the conclusion is wrong, and the gap between those two facts is the subject of this paper. The error is not in the data. The error is in the geometry presupposed by the question the data were asked to answer.

A category that cannot be reliably applied is, on the standard psychometric account, a category that does not exist. But this inference holds only under an assumption so deeply buried it is never stated: that the entity, if real, would announce itself as a bounded region in a space of measured symptoms, and that two trained observers standing before that region would agree on its edges. This is the assumption of the museum. It treats the disorder as a specimen — a thing with a fixed outline, pinned, labeled, viewable from any angle by any competent curator. The disagreement of the curators is taken as evidence that there is no specimen. It is taken, that is, as ontology. It is in fact epistemology, and bad epistemology, because the object was never a specimen at all.

THE GRAMMAR OF THE SPECTRUM

The word spectrum did heavy work in 2013, and most of it was concealed. A spectrum, in its honest sense, is a one-dimensional ordering — wavelengths of light, frequencies of sound — along which position is given by a single scalar. To call autism a spectrum is to claim, whether or not anyone intends the claim, that its presentations differ in degree and not in kind. Severity becomes the master variable. The non-speaking child with profound intellectual disability and the hyperverbal adult who lectures physicians on pharmacology are placed on the same line, separated by quantity.

This is where continuity is quietly mistaken for identity. That two phenomena can be connected by a path of intermediate cases does not make them the same phenomenon. The visible spectrum is continuous in wavelength, yet red and blue are not differences

of degree along a single qualitative axis: they are distinct regimes of the eye's response, distinguished by the photoreceptor populations they recruit and by the perceptual categories they sustain. The continuity of the carrier does not abolish the discreteness of what the carrier carries. A surface with no fence dividing two basins is not a surface with one basin. The DSM-5 found no fence and concluded there was one field. The inference is a non sequitur with the dignity of consensus behind it.

The term of art for this mistake is Ryle's, not Wittgenstein's, and it deserves to be deployed with the precision Ryle gave it. A category mistake, in *The Concept of Mind* ¹², is committed when a predicate is applied to a subject of a kind that cannot logically receive it — when, in the canonical example, the visitor who has been shown the colleges, libraries, and faculties of Oxford asks to be shown the University, having taken the University to be one more building among the buildings. The University is real, but it is not the kind of thing that occupies an address. To ask where it is, on the model of asking where the library is, is to misclassify it categorially. The error is not factual; it is grammatical, in the sense Wittgenstein gives the word ¹³ — a confusion about the kind of move the term in question can sustain.

To ask where the boundary of Asperger's syndrome falls in symptom space is, in this precise sense, a category mistake. It looks empirical and is in fact malformed — a question whose grammar presupposes the very Cartesian framing that the object refuses. It is the philosophical equivalent of asking for the temperature of the number seven. The expected answer does not fail to arrive because the measurement was imprecise. It fails to arrive because the question was the wrong shape.

THE GEOMETRY OF THE OBJECT

Here the argument must become exact, because its entire force depends on a distinction too often invoked as metaphor and never paid for as structure. Everything that follows is built from two propositions, and neither is mine. The first is a century and a half old and is not in dispute among mathematicians; the second is younger and is textbook. If the two are granted — and it is difficult to see on what grounds either could be refused — then the conclusion the paper needs follows without a further premise, and in particular without any appeal to a doctrine the reader has not already accepted.

The first proposition is Klein's. Geometry, in the mature formulation given by the Erlangen Programme ^{14,15}, is the study of invariants: of the properties of a structured set that survive a specified group of transformations. The older intuition, that geometry is the science of space, is displaced by the recognition that there is no such thing as geometry in the singular. There are geometries, each individuated by the group whose action it studies, each with its own inventory of what is preserved and what is destroyed. Euclidean geometry keeps what rigid motion spares: length, angle. Affine geometry keeps less and sees more: parallelism, ratio along a line. Projective geometry keeps still: incidence, cross-ratio. Topology keeps only what continuous deformation cannot abolish: connectedness, the number of holes, the persistence of a fold. What must be held onto here is not the catalogue but the moral of it. To ask what a figure is, tout court, is to ask an incomplete question. One can only ask what it is under a group — and the answers, taken across groups, do not compete. They are answers to different questions about the same thing.

The second proposition is Mandelbrot's, and it is chosen deliberately because it is the least metaphysically ambitious claim in the whole of modern geometry and is nonetheless sufficient. A coastline ^{16,17} is, under the transformations that preserve rectifiable curves, a continuous one-dimensional object; and it is, under the transformations that preserve self-similar scaling, an object of definite fractional dimension. Both descriptions are exact. Neither is a coarsening of the other, and there is no third description, more fundamental than these, of which each would be a projection. The continuity is not an approximation to the fractality, nor the fractality a correction to

the continuity. They are what the object is under two groups, and the object sustains both at once, in full ontological standing, without contradiction and without a preferred term. This is not a philosophical thesis about coastlines. It is a fact about them, as settled as any in the field, and it was settled precisely by refusing to let one geometry speak for the whole.

Set the two propositions side by side and the consequence is immediate. If invariants are relative to a group (Klein), and if a single object can already be shown to carry two invariant structures under two groups, both real and neither reducible to the other (Mandelbrot), then the coexistence within one object of ontologically real, mutually irreducible geometric regimes is not a posit awaiting defense. It is instantiated in the tamest example available. What one is tempted to announce as a bold ontology of multiple regimes is, on inspection, only the general form of a situation the reader has accepted since first meeting the coastline. The single object with more than one true geometry is not the exception that theory must strain to license; it is the ordinary case, and the single-geometry object — the fever, the serum sodium, the tumour in millimetres — is the special one, licensed only where the object happens to reduce to position.

It is worth naming the general situation, if only because the argument will need to refer back to it, and the name should be understood as doing no work the two propositions have not already done. Call it multigeometrism: the condition of an object that sustains distinct, ontologically real geometric regimes, irreducible to one another and accessible only by instruments adequate to each. The word carries no commitment beyond what Klein and Mandelbrot jointly underwrite. It asserts nothing new about coastlines. Its entire content, when it is applied to some further object, lies in a single empirical claim — that this object, too, is of that kind — and that claim stands or falls on evidence about the object, not on the plausibility of the name. To invoke the term responsibly, then, is to discharge a debt each time: to specify the structure, the group of transformations, and the invariants in play. Without that triple specification the word is rhetoric. With it, the word is merely shorthand for a demonstration already given.

The demonstration the paper owes concerns one object in particular. The DSM is, in the exact sense now available, a Euclidean instrument. Its diagnostic logic is metric and additive: each criterion is a coordinate, the diagnosis is a region cut from those coordinates by thresholds, and two presentations are “the same” when their coordinates fall in the same box. This logic is not defective. It is exactly right for objects whose identity is constituted by position, which is to say for the special case in which the single-geometry picture holds. The question is whether the neurodivergent brain is such an object, and the answer, on the evidence, is that it is not — that it belongs instead to the general case, where identity is carried by invariant dynamical structure that no coordinate can hold still.

The claim that the cortex operates in the vicinity of a critical regime — at the edge between order and disorder where information transmission, dynamic range, and computational repertoire are jointly maximized — is no longer a theoretical proposal but a programme with substantial empirical traction. Beggs and Plenz^{18,19}, recording local field potentials from organotypic cortical slices on multielectrode arrays, demonstrated that spontaneous neural activity propagates as scale-free avalanches whose size distributions obey power laws with the exponents predicted for a system in a self-organized critical state. The finding has been replicated in vivo in awake non-human primates²⁰, in human magnetoencephalography²¹, and in resting-state functional magnetic resonance imaging²²; derived theoretically from balanced excitation–inhibition in spiking network models^{23,24}; and shown to be homeostatically maintained across the sleep–wake cycle²⁵. For synthetic statements see Chialvo²⁶, Shew and Plenz²⁷, and Cocchi et al.²⁸. The criticality hypothesis remains contested in its strong form, and the contest is itself part of the evidence: what is no longer contested is that the cortex sits in a dynamical regime in which

power-law statistics, long-range temporal correlations, and metastable attractor structure are first-class properties of the system rather than artifacts of measurement.

For such a system, identity is carried not by the values of variables at an instant but by the structure of the trajectory through state space. The relevant invariant is the attractor: the region of phase space toward which dynamics recur, the shape the evolution traces and returns to under perturbation. Two systems may share an attractor while their instantaneous coordinates differ wildly, and two systems may sit at neighboring coordinates while belonging to entirely different basins separated by a watershed invisible to any single measurement. The mathematical framework is now standard²⁹; its application to the brain is the substance of the work cited above. The attractor is to the trajectory what fractal dimension is to the coastline: a genuine invariant under a group that the metric of the severity axis does not preserve, and therefore an object the Euclidean instrument is constitutively unequipped to see.

This is the resolution of the 2013 paradox, and it is total. The clinicians disagreed about the coordinates because coordinates are the wrong invariant. There is no fence in symptom space because the boundary is not in symptom space — it is a separatrix in phase space, a watershed between basins of attraction, and a separatrix casts no shadow onto the axis of measured severity. One can walk from one basin to another without ever crossing a wall, precisely as one can walk from one watershed to the next over ground that never stops being continuous. The continuity of the terrain does not abolish the divide. It conceals it from the instrument that only measures altitude.

Note what has and has not been claimed. It is not claimed that the severity gradient is illusory. Measure it and one finds a spectrum, and one is not wrong; one is answering a Euclidean question correctly. Measure the dynamical organization and one finds discrete attractors, and one is not wrong either. The two findings no more compete than the length and the fractal dimension of the coastline compete. The error — the whole of the error — is to take the answer the instrument is built to give as the last word on what the object is; to mistake one geometry for the whole of reality, which is the founding error of positivism and the operating assumption of the manual. The spectrum and the subtype were never rival claims about one space. They are claims about different geometries of one object, each true within its regime, neither sovereign over the other. The severity axis is the projection. The attractor is the structure. A mind can be, without contradiction, a point on a continuum and a member of a discrete basin, exactly as a coastline is at once a continuous curve and an object of definite fractal dimension. That this now reads as a restatement of Mandelbrot rather than as a novel proposal is the point; the argument has spent the section earning the right to say it plainly.

There is direct empirical purchase here, not merely promissory analogy. Critical-state metrics derived from the brain's dynamics — long-range temporal correlations, avalanche-size scaling, the functional excitation–inhibition ratio fE/I — discriminate autism from neurotypical development in resting EEG³⁰ and modulate with cognitive load in patterns that differ between autistic and neurotypical children in magnetoencephalography³¹. Excitation–inhibition imbalance is among the most replicated systems-level findings in autism research and is mechanistically tied to the displacement of cortical dynamics away from the critical regime^{32,33,34}. These are not yet a finished biomarker. They are, however, exactly the kind of measurement the argument predicts should discriminate where checklist criteria cannot, and the early returns are consistent with the prediction.

THE PHENOMENOLOGICAL SIGNATURE

If Asperger's syndrome names a distinct attractor rather than a region of the severity axis, the claim is falsifiable in principle, and it must be specified in terms of dynamical invariants rather than symptom counts. What follows is not a diagnostic algorithm

but a description of the configuration that any future operationalization must recover.

The configuration is recognizable, and it was recognized — by Asperger himself in 1944^{35,36}, by Wing when she imported the term into the English literature in 1981³⁷, and by every clinician who has registered the unmistakable gestalt of it before any checklist was scored. Formal language is acquired on time or early, often spectacularly; what diverges is the pragmatic geometry of language — the implicit modeling of the interlocutor's state, the calibration of register, the management of intersubjective space. This is routinely glossed as a deficit of theory of mind³⁸, but the framing is itself a Cartesian artifact, a subtraction operation performed on a presumed common substrate. It is more exactly described as a different default geometry of social simulation: not the absence of a model of other minds but a model built on explicit inference where the neurotypical system runs implicit and automatic interpolation. The architecture is not impoverished; it is differently composed. Where the neurotypical brain pre-computes the social field through fast, low-resolution, embodied heuristics, the configuration here under discussion routes the same problem through slower, higher-resolution, propositional channels. The output can equal or surpass the neurotypical inference in accuracy at the cost of metabolic and temporal expense the neurotypical system never pays.

The cognitive architecture shows further structural signatures. Hyperfocus exhibits domain-specific depth that systematically exceeds contextual demand — the depth is not recruited to a goal, it is the attractor's own shape. The relationship to pattern, to system, to the invariant beneath the surface, is not incidental to the profile but constitutive of it^{39,40}. Sensory processing is reorganized in ways that suggest altered noise-to-signal handling rather than mere hyper- or hyposensitivity⁴¹. The developmental trajectory is its own invariant: language onset, the timing of social differentiation, the emergence and stabilization of circumscribed interests follow patterns sufficiently regular across cohorts, decades, and languages to make their convergence under chance vanishingly unlikely.

These are not points low on a severity line shared with non-speaking autism. They are the signature of a different basin — a system organized around a different equilibrium, recurring to a different shape under perturbation. The proof that the distinction is real is not that two raters agree on a threshold. It is that the configuration recurs, is recognized across observers and decades and languages, and predicts a developmental trajectory and a phenomenological interior that the dimensional model cannot generate from severity alone.

A terminological note belongs here. The neurodivergent mind, on the account proposed, is not merely a brain in a state but a form of life inhabiting a dynamical regime — what I will call, with appropriate caution, a nosological Dasein: a mode of being whose persistence is the persistence of a basin of attraction in cognitive phase space, and whose first-person interior is not separable from that dynamical signature. The term is introduced here as a placeholder for work taken up elsewhere; it is meant to mark, not to settle, the conceptual territory between Heideggerian *Being* and the formal description of attractor occupancy.

The orientation that motivates this terminology has a long lineage in psychiatric thought. Jaspers⁴², in *Allgemeine Psychopathologie*, already insisted that the form of an experience, and not merely its content, is the proper level at which psychopathological description must operate, and that nosological categories which do not respect that level become arbitrary. The phenomenological psychopathology developed in the second half of the twentieth century, and renewed in the present generation by Sass and Parnas⁴³ and Stanghellini⁴⁴, among others, has refined the claim into a working method: the disorder is to be characterized first by the structure of the subject's relation to world and self, and only afterwards by the inventory of behaviors that this structure produces. The argument of this paper is consistent with that programme and

extends it in a particular direction. Where phenomenological psychopathology asks what it is like, from within, to inhabit a given basin, the formal argument developed here asks what the basin is, as a structure in phase space — which is to say, it asks after the invariant under a group the severity metric does not preserve. The two questions are complementary; they describe the same object under different geometries, and neither is reducible to the other. This is the same complementarity Klein taught for figures and Mandelbrot for coastlines, carried now to a psychiatric kind.

THE SUBSTRATE AS SYMPTOM

Why, then, the collapse? Not from malice and not from stupidity, but from the institutional gravity that pulls every taxonomy toward what can be funded, regulated, and adjudicated in Hacking's account of "looping kinds"^{10,11} and Cooper's analysis of classificatory institutions in psychiatry⁴⁵. A single dimensional spectrum is administratively superior in every respect that is not scientific. It simplifies service eligibility, which can be pegged to a severity level. It simplifies the clinical encounter, which need no longer discriminate between basins. It simplifies the actuarial and legal machinery that surrounds any diagnosis at scale. The 2013 revision optimized for institutional legibility, and it called the optimization a discovery.

The museum is the apt figure. A museum preserves the dead in a posture of the living — the specimen fixed, the outline crisp, the label authoritative, the formaldehyde doing its quiet work of arresting every process that made the organism an organism. The DSM, in its dimensional turn, did not abolish categories; it perfected them into specimens. It achieved the curator's dream of an exhibit on which all curators agree, and it achieved it by the only means available: by killing the thing whose life consisted precisely in the dynamics that no fixed coordinate can hold. The reliability went up because the object went still. One does not improve the study of rivers by freezing them, however much easier the frozen river is to measure.

The concessions granted at the outset can now be redeemed rather than merely repeated, because intellectual honesty is the only nonnegotiable here and the recovery proposed must answer the dimensional camp's real cards rather than wish them away. None of the facts conceded in the introduction is denied; all of it is reframed. The poor reliability indicts the instrument, not the object; the social inflation of the label indicts its administration, not its reality; and the empirical continuity is exactly what the argument of the previous section requires, because a separatrix between basins of attraction leaves no valley on the severity axis when severity is the projection chosen for measurement. The dimensionalists found precisely what a correct theory says they should have found — a continuous distribution along the axis they measured — and then drew from it the one conclusion the theory forbids: that what fails to appear on the chosen axis fails to exist. That inference is the coastline paradox in clinical dress. It reads the finite length off the metric ruler and concludes the object has no fractal dimension.

RECOVERY, NOT NOSTALGIA

To recover Asperger's syndrome is therefore not to restore a box. It is to change the instrument. The proposal is to specify the construct by its dynamical invariants — the structure of its attractor, the geometry of its trajectory, the signature that persists under the transformations of development and context — rather than by a count of surface features sampled at a clinical instant. This is harder. It requires methods adequate to complex systems: longitudinal trajectory analysis rather than cross-sectional snapshot^{46,47}; the search for invariant structure rather than the search for threshold boundaries; the willingness to let the object dictate the geometry instead of forcing the object into the geometry the manual already owns. It also requires the explicit articulation of what is now a substantial set of candidate measurement instruments — long-range temporal correlations in EEG⁴⁸; avalanche-size distributions in resting MEG and EEG²¹;

the functional excitation-inhibition ratio ³⁰; metastable connectivity dynamics in fMRI ⁴⁹; and the developmental trajectories obtained from longitudinal designs in large autism cohorts ^{50,51}. None of these is yet a finished diagnostic; together they sketch the kind of instrument the object requires.

This dissolves the false choice that has organized the entire debate. One need not decide between spectrum and subtype as though they were rival claims about the same space, for the same reason one need not decide whether a coastline is a curve or a fractal: the disjunction is spurious. They are claims about different geometries of the same object, both true within their regime, neither sovereign over the other. The spectrum is the projection onto the severity axis. The attractor is the structure in phase space. A mind can be, without contradiction, a point on a continuum and a member of a discrete basin, exactly as a coastline can be both a continuous curve and an object of definite fractal dimension ^{16,17}. The contradiction appears only when one geometry is mistaken for the whole of reality.

A predictable objection deserves a direct answer. It will be said that the proposal merely substitutes one set of opaque measurements for another, and that until critical-state metrics achieve the clinical reliability the dimensional checklist provides, the move is premature. The objection misreads the level of the claim. The argument here is not that fE/I or avalanche statistics should replace the DSM tomorrow; it is that the standard against which any future instrument is to be judged must be adequacy to the object, not procedural smoothness in the clinic. A measurement that is harder to perform but addresses the right invariant is, by every standard except administrative convenience, superior to a measurement that is easy and addresses the wrong one. The dimensional checklist has the epistemic status of a thermometer used to assess a magnetic field: it returns a reading, the reading is reproducible, and the reading bears no determinate relation to the property of interest.

It will also be said — and this objection is more substantive — that the apparatus invoked here, drawn from statistical physics and dynamical systems theory, has yielded fewer mature clinical applications than its theoretical scope would predict, and that the field of “criticality in the brain” remains methodologically heterogeneous and partially contested ^{52,53}. This is correct, and it is not denied. The position taken here is not that the empirical programme is closed but that it is the programme of the right shape. A nosology built on the recognition that its object is a dynamical system is unfinished. A nosology built on the assumption that its object is not will not be finished by further refinement; it will need to be replaced.

CONCLUSION

The DSM cannot name the neurodivergent mind, and the failure is not contingent. It is structural. The manual is a Euclidean instrument bequeathed by an eighteenth-century picture of nature in which to be real was to occupy a fixed position in a measurable space, and in which classification was the reading of coordinates. That picture was always a special case — the simplification available under the narrow conditions where systems behave linearly and identity reduces to position. The neurodivergent brain does not meet those conditions. It is a complex adaptive system whose reality is its dynamics, and dynamics cannot be filed.

The recovery of Asperger’s syndrome is, in the end, a single methodological insistence raised to the level of principle: the instrument must be adequate to its object. When the object is an attractor and the instrument is a checklist, the diagnosis is not imprecise. It is a category error wearing the costume of clinical rigor — a specimen in the categorical museum, perfectly preserved, perfectly dead, while the living system it was meant to name walks out through the door no curator thought to guard.

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REFERENCES

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Washington, DC: APA; 1994.
2. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Arlington, VA: APA; 2013.
3. Klin A, Pauls D, Schultz R, Volkmar FR. Three diagnostic approaches to Asperger syndrome: implications for research. *J Autism Dev Disord*. 2005;35(2):221–34. doi:10.1007/s10803-004-2001-y
4. Mahjouri S, Lord CE. What the DSM-5 portends for research, diagnosis, and treatment of autism spectrum disorders. *Curr Psychiatry Rep*. 2012;14(6):739–47. doi:10.1007/s11920-012-0327-2
5. Volkmar FR, McPartland JC. From Kanner to DSM-5: autism as an evolving diagnostic concept. *Annu Rev Clin Psychol*. 2014;10:193–212. doi:10.1146/annurev-clinpsy-032813-153710
6. Lord C, Jones RM. Annual research review: re-thinking the classification of autism spectrum disorders. *J Child Psychol Psychiatry*. 2012;53(5):490–509. doi:10.1111/j.1469-7610.2012.02547.x
7. Huerta M, Bishop SL, Duncan A, Hus V, Lord C. Application of DSM-5 criteria for autism spectrum disorder to three samples of children with DSM-IV diagnoses of pervasive developmental disorders. *Am J Psychiatry*. 2012;169(10):1056–64. doi:10.1176/appi.ajp.2012.12020276
8. Constantino JN, Todd RD. Autistic traits in the general population: a twin study. *Arch Gen Psychiatry*. 2003;60(5):524–30. doi:10.1001/archpsyc.60.5.524
9. Lundström S, Chang Z, Råstam M, Gillberg C, Larsson H, Anckarsäter H, et al. Autism spectrum disorders and autistic-like traits: similar etiology in the extreme end and the normal variation. *Arch Gen Psychiatry*. 2012;69(1):46–52. doi:10.1001/archgenpsychiatry.2011.144
10. Hacking I. The looping effects of human kinds. In: Sperber D, Premack D, Premack AJ, editors. *Causal Cognition: A Multidisciplinary Debate*. Oxford: Clarendon Press; 1995. p. 351–94.
11. Hacking I. *The Social Construction of What?* Cambridge, MA: Harvard University Press; 1999.
12. Ryle G. *The Concept of Mind*. London: Hutchinson; 1949.
13. Wittgenstein L. *Philosophical Investigations*. Anscombe GEM, translator. Oxford: Blackwell; 1953.
14. Klein F. *Vergleichende Betrachtungen über neuere geometrische Forschungen* [Erlangen Programme]. Erlangen: Deichert; 1872.
15. Rowe DE. The early geometrical works of Sophus Lie and Felix Klein. In: Rowe DE, McCleary J, editors. *The History of Modern Mathematics*, Vol. I. Boston: Academic Press; 1989. p. 209–73.
16. Mandelbrot BB. How long is the coast of Britain? Statistical self-similarity and fractional dimension. *Science*. 1967;156(3775):636–8. doi:10.1126/science.156.3775.636
17. Mandelbrot BB. *The Fractal Geometry of Nature*. New York: W. H. Freeman; 1982.
18. Beggs JM, Plenz D. Neuronal avalanches in neocortical circuits. *J Neurosci*. 2003;23(35):11167–77. doi:10.1523/JNEUROSCI.23-35-11167.2003
19. Beggs JM, Plenz D. Neuronal avalanches are diverse and precise activity patterns that are stable for many hours in cortical slice

- cultures. *J Neurosci*. 2004;24(22):5216–29. doi:10.1523/JNEUROSCI.0540-04.2004
20. Petermann T, Thiagarajan TC, Lebedev MA, Nicoletis MAL, Chialvo DR, Plenz D. Spontaneous cortical activity in awake monkeys composed of neuronal avalanches. *Proc Natl Acad Sci USA*. 2009;106(37):15921–6. doi:10.1073/pnas.0904089106
 21. Shriki O, Alstott J, Carver F, Holroyd T, Henson RNA, Smith ML, et al. Neuronal avalanches in the resting MEG of the human brain. *J Neurosci*. 2013;33(16):7079–90. doi:10.1523/JNEUROSCI.4286-12.2013
 22. Tagliazucchi E, Balenzuela P, Fraiman D, Chialvo DR. Criticality in large-scale brain fMRI dynamics unveiled by a novel point process analysis. *Front Physiol*. 2012;3:15. doi:10.3389/fphys.2012.00015
 23. Poil SS, Hardstone R, Mansvelder HD, Linkenkaer-Hansen K. Critical-state dynamics of avalanches and oscillations jointly emerge from balanced excitation/inhibition in neuronal networks. *J Neurosci*. 2012;32(29):9817–23. doi:10.1523/JNEUROSCI.5990-11.2012
 24. Friedman N, Ito S, Brinkman BAW, Shimono M, DeVille REL, Dahmen KA, et al. Universal critical dynamics in high resolution neuronal avalanche data. *Phys Rev Lett*. 2012;108(20):208102. doi:10.1103/PhysRevLett.108.208102
 25. Ma Z, Turrigiano GG, Wessel R, Hengen KB. Cortical circuit dynamics are homeostatically tuned to criticality in vivo. *Neuron*. 2019;104(4):655–664.e4. doi:10.1016/j.neuron.2019.08.031
 26. Chialvo DR. Emergent complex neural dynamics. *Nat Phys*. 2010;6(10):744–50. doi:10.1038/nphys1803
 27. Shew WL, Plenz D. The functional benefits of criticality in the cortex. *Neuroscientist*. 2013;19(1):88–100. doi:10.1177/1073858412445487
 28. Cocchi L, Gollo LL, Zalesky A, Breakspear M. Criticality in the brain: a synthesis of neurobiology, models and cognition. *Prog Neurobiol*. 2017;158:132–52. doi:10.1016/j.pneurobio.2017.07.002
 29. Strogatz SH. *Nonlinear Dynamics and Chaos*. 2nd ed. Boulder, CO: Westview Press; 2015.
 30. Bruining H, Hardstone R, Juarez-Martinez EL, Sprengers J, Avramiea AE, Simpraga S, et al. Measurement of excitation-inhibition ratio in autism spectrum disorder using critical brain dynamics. *Sci Rep*. 2020;10:9195. doi:10.1038/s41598-020-65500-4
 31. Tinker J, Velazquez JLP. Power law scaling in synchronization of brain signals depends on cognitive load. *Front Syst Neurosci*. 2014;8:73. doi:10.3389/fnsys.2014.00073
 32. Rubenstein JLR, Merzenich MM. Model of autism: increased ratio of excitation/inhibition in key neural systems. *Genes Brain Behav*. 2003;2(5):255–67. doi:10.1034/j.1601-183X.2003.00037.x
 33. Yizhar O, Fenno LE, Prigge M, Schneider F, Davidson TJ, O'Shea DJ, et al. Neocortical excitation/inhibition balance in information processing and social dysfunction. *Nature*. 2011;477(7363):171–8. doi:10.1038/nature10360
 34. Sohal VS, Rubenstein JLR. Excitation-inhibition balance as a framework for investigating mechanisms in neuropsychiatric disorders. *Mol Psychiatry*. 2019;24(9):1248–57. doi:10.1038/s41380-019-0426-0
 35. Asperger H. Die 'Autistischen Psychopathen' im Kindesalter. *Arch Psychiatr Nervenkr*. 1944;117:76–136.
 36. Frith U, editor and translator. *Autism and Asperger Syndrome*. Cambridge: Cambridge University Press; 1991.
 37. Wing L. Asperger's syndrome: a clinical account. *Psychol Med*. 1981;11(1):115–29. doi:10.1017/S0033291700053332
 38. Baron-Cohen S, Leslie AM, Frith U. Does the autistic child have a 'theory of mind'? *Cognition*. 1985;21(1):37–46. doi:10.1016/0010-0277(85)90022-8
 39. Baron-Cohen S. The extreme male brain theory of autism. *Trends Cogn Sci*. 2002;6(6):248–54. doi:10.1016/S1364-6613(02)01904-6
 40. Mottron L, Dawson M, Soulières I, Hubert B, Burack J. Enhanced perceptual functioning in autism: an update, and eight principles of autistic perception. *J Autism Dev Disord*. 2006;36(1):27–43. doi:10.1007/s10803-005-0040-7
 41. Robertson CE, Baron-Cohen S. Sensory perception in autism. *Nat Rev Neurosci*. 2017;18(11):671–84. doi:10.1038/nrn.2017.112
 42. Jaspers K. *General Psychopathology*. Hoenig J, Hamilton MW, translators. 2 vols. Baltimore: Johns Hopkins University Press; 1997. (Original work published 1913.)
 43. Sass LA, Parnas J. Schizophrenia, consciousness, and the self. *Schizophr Bull*. 2003;29(3):427–44. doi:10.1093/oxfordjournals.schbul.a007017
 44. Stanghellini G. *Disembodied Spirits and Deanimated Bodies: The Psychopathology of Common Sense*. Oxford: Oxford University Press; 2004. doi:10.1093/med/9780198520894.001.0001
 45. Cooper R. *Diagnosing the Diagnostic and Statistical Manual of Mental Disorders*. London: Karnac; 2014.
 46. Pellicano E. The development of executive function in autism. *Autism Res Treat*. 2012;2012:146132. doi:10.1155/2012/146132
 47. Insel TR. The NIMH Research Domain Criteria (RDoC) Project: precision medicine for psychiatry. *Am J Psychiatry*. 2014;171(4):395–7. doi:10.1176/appi.ajp.2014.14020138
 48. Linkenkaer-Hansen K, Nikouline VV, Palva JM, Ilmoniemi RJ. Long-range temporal correlations and scaling behavior in human brain oscillations. *J Neurosci*. 2001;21(4):1370–7. doi:10.1523/JNEUROSCI.21-04-01370.2001
 49. Hellyer PJ, Scott G, Shanahan M, Sharp DJ, Leech R. Cognitive flexibility through metastable neural dynamics is disrupted by damage to the structural connectome. *J Neurosci*. 2015;35(24):9050–63. doi:10.1523/JNEUROSCI.4648-14.2015
 50. Loth E, Charman T, Mason L, Tillmann J, Jones EJM, Wooldridge C, et al. The EU-AIMS Longitudinal European Autism Project (LEAP): design and methodologies to identify and validate stratification biomarkers for autism spectrum disorders. *Mol Autism*. 2017;8:24. doi:10.1186/s13229-017-0146-8
 51. Charman T, Loth E, Tillmann J, Crawley D, Wooldridge C, Goyard D, et al. The EU-AIMS Longitudinal European Autism Project (LEAP): clinical characterisation. *Mol Autism*. 2017;8:27. doi:10.1186/s13229-017-0145-9
 52. Beggs JM, Timme N. Being critical of criticality in the brain. *Front Physiol*. 2012;3:163. doi:10.3389/fphys.2012.00163
 53. Wilting J, Priesemann V. 25 years of criticality in neuroscience — established results, open controversies, novel concepts. *Curr Opin Neurobiol*. 2019;58:105–11. doi:10.1016/j.conb.2019.08.002