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Puzzles: a method of discovery for the social sciences

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ABSTRACT

While social sciences zealously pursue answers, this paper argues that we should make a greater effort to discover challenging questions; and that surprising observations that violate preconceptions – puzzles that is – can contribute to this effort. Drawing on classic social science theories, I show how much foundational knowledge was initially inspired by puzzles. I then illustrate practical pathways for identifying new puzzles and transforming generic inquiries into specific, fruitful questions. I conclude by suggesting institutional and individual practices that can foster puzzle-driven research.

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The most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka!', but 'That's funny...' (Isaac Asimov, attributed)

In this paper, I argue that focusing on anomalous, unexpected and counterintuitive facts – let's call them *puzzles* for short – allows us to identify new fertile questions about phenomena we are trying to explain and even to discover new phenomena.

I believe that rather than striving to finesse our answers to well-trodden questions, we should redirect some of our energies to uncover new questions, and that puzzles can help us in this endeavour: they are a corrective to our self-assurance that we know the questions that really matters and a challenge to our prejudices: "Science – wrote Carl Sagan – invites us to let the facts in, *even when they don't conform to our preconceptions*" ([Sagan, 1990](#), my italics). In what follows I hope to show that the path of the puzzles can lead us to unearth unexpected facts and in turn stimulate new hypotheses.

Puzzles in science

I take a scientific puzzle to be *an observational prompt that challenges our preconceptions about some phenomenon and raises questions we previously ignored or disregarded*. The observation may concern a fact or a correlation between facts that violate our expectations – whether derived from intuition, experience, logic or theory; or just from what we deem normal in our ordinary world. Clearly, the more robust the source of the expectations that are violated, the more interesting the puzzle is likely to be. But a puzzle's relevance is

ultimately measured not by its source but by the epistemic results we obtain investigating it.

While many puzzles that captivate us at first, upon closer examination, dissolve into spurious correlations or shrink into triviality, a few of them defy swift and simple resolution and alert us to new horizons by poking their heads through the crust that shields social phenomena from our accurate perception.

The epistemic fruits obtained from investigating a puzzle can turn out to be of various levels of interest for science, from medium importance to large, even very large, of the kind that Thomas Kuhn described as the anomalies that bring about a paradigm shift.

Herewith two examples that changed the history of science.

As even schoolchildren know, Isaac Newton, while resting in a contemplative mood under a tree, suddenly wondered why apples, when they fall, do so downward – that it was an apple that fell on his head that triggered that thought is likely an embellishment, but the story of that intuition, which Newton recounted to his niece and to William Stukeley, his biographer, seems true.¹ It was 1666. Newton spent the following 20 years grappling with that question, which eventually led him to identify and describe mathematically gravity, the *invisible* force that binds us to the earth, but is only inferable from its effects. Newton's puzzle led not just to asking new questions about a phenomenon he was investigating, but to the discovery of an altogether new phenomenon.

The second puzzle inspired the grandest theory in the history of biology: natural selection. While visiting the Galápagos Islands aboard HMS Beagle in 1835, Charles Darwin observed that finches across different islands possessed strikingly different beak shapes and sizes. The "that's funny..." moment came later, in 1837, when ornithologist John Gould informed him that these birds were closely related, distinct species that had all diverged from a single mainland ancestor. At a time when species were widely believed to be fixed at Creation, this natural experiment was shocking.² Darwin realized these variations were the product of natural selection: spontaneous heritable variations initially altered individual foraging efficiency based on an island's specific food supply, and those traits that optimized survival were passed on, eventually reshaping the entire population through superior reproductive success.

1. On the webpage of Trinity College, Cambridge, where Newton was a Fellow, we read that the apple tree we now see in the College backs "was grafted from the original tree and planted in 1954".

2. Pietro Corsi (2005) who researched the debates on evolution before Darwin, found that the belief in the immutability of species was already being challenged by various scientists.

Falling apples and beaks shapes – seemingly insignificant observations led to the most significant discoveries, a lesson for us in the social sciences too.

Puzzles in social science, the classics

I identified the observations that in the social sciences challenged settled ideas and led to foundational discoveries. Even without a systematic search, I could think of fifteen of them – I cannot think of a better way to convey the importance of observational prompts than simply listing the ensemble of the contributions they spurred in the social sciences over more than a century. I present the puzzles below but will not elaborate on the answers they received nor on the copious literature they generated – these are probably familiar to the readers or easily accessible. My aim is to counter our bias to teach and learn about answers while relegating the questions that led to them in the background. We bravely test hypotheses but show little concern with how we arrived at formulating them.

I present these cases chronologically by the year of their emergence, labelled with the names of the scholars who identified them.³

1856, Alexis de Tocqueville: *Why do revolutions occur when material conditions improve?* This observation, known as the T-paradox, subverts the folk belief – and the predominant Marxist view – that the preeminent condition propelling people to revolt would be the exacerbation of poverty and exploitation.

1896, Vilfredo Pareto: *Why is wealth never evenly distributed, but a small percentage of the people own most of it?* Called the Pareto Principle (not to be confused with the Pareto Optimum), it conforms to an 80:20 power law distribution. He calculated it by observing land distribution in Italy and finding that 80% of the land was owned by 20% of the people. It has been applied to other goods, such as time management and academic citations. Pareto applied it even to his kitchen garden, observing that 20% of pea pods produced 80% of the peas. He regarded it not as a law but an observable regularity. The mechanisms generating it are not altogether clear.

1897, Émile Durkheim: *Why do Protestants commit suicide more frequently than Catholics and Jews?* This observation, one of several he made on the frequency of suicide, shook the idea that suicide is merely a psychological gesture, showing

3. Here organized chronologically to illustrate the historical recurrence of puzzle driven progress, these classic contributions could equally be categorized by thematic clusters, such as the structural roots of inequality or the social power of beliefs.

that the seemingly most private of acts has a social dimension. This observation led Durkheim to develop the theory of social cohesion and anomie.

1899, Thorstein Veblen: *Why do the leisure classes waste resources on luxurious and conspicuous appurtenances of no practical use and engage in futile, unprofitable activities?* Veblen argued that the time and money they disburse are aimed at, or at least have the effect of communicating their wealth credibly to their peers – his theory is an ancestor of signalling theory.⁴

1904, Max Weber: *Why are Protestant regions in Germany developing faster and cumulating more wealth than Catholic ones?* This observation inspired Weber's idea that the religious ethic among protestants, Calvinists especially, was conducive to practices that favoured the development of capitalism. Even if its accuracy has been challenged, the idea was the first to causally connect the economy to religious beliefs, hitherto largely regarded as separate spheres. (Weber also wondered why China had not become capitalist and attributed it to Confucianism).

1906, Werner Sombart: *Why is there no socialism in the United States?* This was a surprising observation because at the time socialism was making inroads in many other nations around the world. He pointed to American prosperity, the two-party system blocking third parties, high social mobility, and the "safety valve" of the frontier – ideas still relevant today for those grappling with American exceptionalism.

1911, Robert Michels: *Why do organizations, regardless of their democratic intentions, end up being run by an elite while their members are disempowered?* Boldly dubbed "the Iron law of oligarchy", it is still being tested today with mixed but interesting results: while most organisations develop an oligarchy as predicted, others develop antibodies to resist that tendency. It may not be made of iron, but it captures the fact that democratic practices do not survive spontaneously but need to be actively safeguarded.

1931, Floyd H. Allport and Daniel Katz: *Why do students who privately support the admission of minorities, mistakenly believe that others in their group would object to it and veil their preference as a result?* This observation has come to be known as "pluralistic ignorance". It shows we can wrongly assume that the status quo we observe is due to preferences or social norms. The puzzle has two sides: why students falsify their preferences in response to what they think others prefer and why they misperceive others' preferences in the first place. It has been applied to explain campus alcohol and drug use, the reluctance to ask questions

4. The observation behind Veblen's theory had already been made by John Rae (1834).

in lectures, the hesitancy to intervene in emergencies, and, importantly, why social change that would be welcome by most is slow to come about.

1946, Samuel A. Stouffer: *Why are soldiers more dissatisfied with the promotion system of their army corps the greater are the chances to be promoted?* A puzzling finding for the obverse seems more intuitive; it led to the development of the theory of relative deprivation and countless research.

1948, Robert K. Merton: *Why can false rumours topple a solvent bank?* He observed that in the 1930s, when depositors believed initially false rumours of insolvency, and panicked and rushed to withdraw their money, the collective effect caused the banks to go bankrupt. This he defined as the *self-fulfilling prophecy*, which has become a core element of a set of phenomena in which subjective beliefs, including objectively untrue ones, cause real action responses.⁵

1957, Morton Grodzins: *Why do white families remain in a neighbourhood as racial diversity grows, but at a certain point – "the tipping point" – they move out en masse ("white flight")?* Using a mixed-method approach, Morton Grodzins mathematically proved that a demographic threshold existed and explained the social anxieties and panic-driven behaviours that caused it. Thomas Schelling first and Mark Granovetter later developed the finding.

1959, Leon Festinger: *Why do the doomsday cult members called the Seekers strengthen their beliefs when their predictions fail?* The rational response of those facing the failure of their predictions would be to revise their beliefs, the opposite of how the Seekers' responded – this observation inspired Festinger to develop A theory of cognitive dissonance.

1968, Robert Merton: *why do individuals or groups with initial small advantages (wealth, citations) overtime accumulate disproportionately more of those advantages, while those with less fall further behind?* Dubbed the Matthew Effect (from St Matthew's words in the Gospels) or "the cumulative advantage", it is the staple of many studies of inequalities, and its applicability has been shown in different areas. It is propelled by a variety of mechanisms which are still being studied. The initial advantage can be minuscule and due to luck, while over time creating large divergences.

1973, Mark Granovetter: *Why are acquaintances ("weak ties") more helpful in finding a job than friends ("strong ties") are?* This empirical observation defied the intuitive idea that those who are closest are those who help us the most — it

5. Robert K. Merton, (1948) also relied on the "Thomas Theorem", formulated in 1928 by William and Dorothy Thomas (1928), and summed up as: "If men define situations as real, they are real in their consequences". <https://archive.org/details/childinamerica00thom/page/572/mode/2up>

was the inspiration of network analysis and has motivated countless studies and theorising.

1974, Richard Easterlin: *While richer individuals are happier than poorer individuals within a country, why a country's population average happiness does not increase over time as its wealth grows?* This finding is a foundation of the studies of happiness as related to income growth and relative income perceptions. It has stimulated countless studies and is still being debated today.

My list of classic puzzles ends in 1974. Our predecessors used their observations naturally without explicitly dwelling on their method of discovery. For the curious mind, following surprising hunches is an instinctive way to go about discovering the world, that begins when we are children. This suggests that there must be many studies post 1974 that were triggered by puzzles but did not make much of it. I myself have used puzzles as a springboard for research and teaching, but until now I did not ponder in depth on that method. My studies of trust, suicide missions, veiling, and the presence of engineers among Islamists extremists emerged from challenging observations of one kind or another. The next step would therefore be to search for them and assess their contributions, but this search will be pursued in a follow-up article.

Discovering Puzzles

Hiding in Plain Sight Many scientific puzzles do not require exotic data; they can be hiding in full view, and remain dormant until, that is, a "prepared mind" realises what everyone else failed to notice. Isaac Newton's breakthrough regarding gravity did not stem from observing an alternative universe, but most probably from imagining a counterfactual one where objects don't fall downward.

Social science discoveries too have relied on anomalies that were hiding in plain sight. It was not hard for Thorstein Veblen to notice the upper classes actively "wasting" time and wealth on inane pastimes. Werner Sombart looked at a well-known reality—the marginal presence of socialism in the United States compared to contemporary industrial nations—to investigate American exceptionalism. Puzzles spring to life the moment we recognise that something that happens under our nose requires an explanation.

Serendipity Other puzzles land in a researcher's lap unexpectedly through serendipity. This is often activated by communication between distinct worlds. For instance, a chance encounter at an Oxford High-Table dinner with an Egyptian colleague revealed to me that Islamic extremists were thriving in Cairo's engineering faculties. This interaction—a good example of the benefits of "weak

ties"— disrupted the conventional image of an engineer and eventually resulted in the book *Engineers of Jihad* I co-wrote with Steffen Hertog.

Serendipity is a cornerstone of scientific discovery generally; in medicine, for instance, think of the famous case of penicillin or in psychology, think of Ivan Pavlov, who in 1897 noticed dogs salivating at the mere entrance of a lab assistant before food was even presented. This event challenged the basic stimulus-response assumptions and birthed the theory of classical conditioning.

Studying History Researchers do not have to rely on luck, but can court serendipity proactively, and one way to do that is by studying history, with an eye to unearth facts that surprise modern preconceptions. Alexis de Tocqueville discovered that the French people were materially better off in 1780 than in 1600, yet this improvement provoked greater frustration and triggered the 1789 revolution. This led to his famous insight that a bad government's most critical moment arrives when it takes its first steps toward reform. Historian Carlo Ginzburg even invented a method – he dubbed the "Venetian Roulette" – to woo serendipity when working in the archives: to choose which folder to read among the thousands of folders in the archive he drew four random numbers and retrieved the folder identified by that number (this led to his discovery of a 17th-century fertility cult, *I Benandanti*, on which he wrote a book).⁶

Reading the News High-quality media too can reveal anomalies because commercial press outlets operate on the "man bites dog" principle, giving them a strong incentive to report surprising facts. For example, The Economist reported a striking global reversal where families in developing countries now have no bias against having girls and in Western countries even prefer daughters over sons (The Economist, June 5th 2025). A recent survey of 23,000 people across 29 countries revealed the jaw-dropping fact that 31% of Gen Z men believe a wife should always obey her husband, compared to just 13% of Baby Boomer men. I read this news in some newspaper and found the source.⁷ Though researchers must scrutinize media news to avoid exaggerated claims, the news remains a goldmine for unearthing surprising findings.

Exploring Data Puzzles can be equally powerful when investigating a pre-existing macro-question. Émile Durkheim provides the archetype for this approach. He began exploring secondary data with the simple intention of describing suicide, but dissecting the statistics revealed an anomaly: Protestants committed suicide at higher rates than Catholics and Jews. Rather than guessing wildly, Durkheim used this specific data variation to build his theory of social integration and anomie.

6. I am grateful to Fabrizio Bernardi for telling me about this.

7. The survey was conducted by IPSOS and the Global Institute for Women's Leadership at King's College Business School, London. www.kcl.ac.uk/news/almost-a-third-of-gen-z-men-agree-a-wife-should-obey-her-husband

Durkheim's approach demonstrates the two invaluable transformations that occur when a researcher embraces a specific puzzle:

- Flipping the baseline: It reverses a massive, unmanageable question ("What causes suicide?") into a focused baseline ("What protects people from committing suicide?").
- Imposing a strict constraint on the cause: what protects people from committing suicide must be a feature that separates Protestants from Catholics and Jews.

Whether stumbled upon through luck, chance encounters, historical reading, media consumption, or statistical data exploration, a puzzle provides more precise logical boundaries to guide social scientists toward genuine breakthroughs.

Barriers to Puzzle-Driven Research

Let's not forget that, as Louis Pasteur famously said, "Dans les champs de l'observation, le hasard ne favorise que les esprits préparés." This disposition is not to be taken for granted. Ideology and methodological intolerance stunt scientific curiosity, causing scholars to belittle or dismiss unexpected anomalies rather than investigate them. Yet even moderately open-minded academics often treat anomalies as mere dinner-table trivia, good at most for armchair explanations. For instance, when presented with the overrepresentation of engineers among extremists, many shrugged it off with the incorrect idea that they were 'obviously' there as bomb-making experts.

These blasé reactions are not driven by 'bad' character but rather represent individually rational adaptations to the academic constraints that paralyze creative risk-taking:

- Answer Bias: Academic journals and grant-giving bodies aggressively favour finalized answers and quick and ready theoretical models over compelling, unexplained questions. Funders often absurdly demand to know the implications of a study before it even begins.
- Labour Market Pressures: Investigating a deep puzzle is a slow process that clashes with a job market demanding fast, high-volume publication outputs.

- Unpredictable Outcomes: The ultimate "epistemic harvest" of an anomaly cannot be known in advance.

Unpacking a puzzle requires a risky time investment. For example, verifying and cracking the engineer-extremist puzzle took ten years of intermittent work, including three years just to collect baseline data. Because we already held tenure, we could absorb the risk of coming up empty-handed. For junior, untenured colleagues, embarking on such unpredictable, long-term projects is structurally discouraged, steering them away from true discovery toward safe, uninspired gap-filling.

Promoting puzzle-driven research

We can take heart by knowing that we are not alone; a creative mindset is championed by natural scientists too. Two initiatives are worth mentioning. One is Slow Science, a proposal designed to promote scientific depth and quality over speed (www.slow-science.com). Another is "Night Science"— which means promoting the creative, improvisational process whereby hypotheses are generated through questions born from contradictions, distinguishing it from the structured hypothesis testing of "Day Science" (<https://night-science.org/>).

To promote puzzle-driven research, institutions and individuals must evolve new practices. Herewith my modest proposals.

Institutions

- Universities: Institutions should encourage the discussion of challenging, open-ended questions, accepting that some high-risk projects may result in dead ends.
- Funding Bodies: Grant agencies should introduce two-step grants. These would feature smaller initial funds to document a puzzle's validity, followed by larger grants to investigate its underlying causes.
- Academic Journals: Peer-reviewed journals should reserve dedicated space for publishing well-researched puzzles, even if a definitive explanation is not yet available.

Researchers Individual scholars and educators should adopt proactive habits to stimulate creative breakthroughs:

- Give personal curiosity a wide berth by reading history, magazines, and newspapers.
- Utilize exploratory statistics or ethnographies to uncover unexpected links or events.
- Treat challenging anecdotes seriously rather than disparage them as "anecdotal evidence".
- Invest time to rigorously verify whether a perceived puzzle is genuine or merely spurious.
- Avoid prematurely dismissing unexpected empirical findings as mere research errors.
- Remain flexible and willing to abandon original research goals if serendipity strikes.
- Pursue "intelligent socialization" with diverse circles, students, and colleagues to iteratively develop raw ideas.

Overcoming Intellectual Biases Social scientists frequently suffer from the belief that major answers can only grow from major questions. While studying a broad topic like post-COVID demographic trends is automatically taken seriously, narrow inquiries—such as why theology books are the most frequently stolen items in Oxford libraries—are often dismissed as jokes. Yet, history proves that grand frameworks often emerge from puny observations. For example, Albert Hirschman formulated his core theory of *Exit, Voice, and Loyalty* by simply observing that members of declining organizations often raise their voices rather than exiting the market as economics would predict.

Reforming Educational Approach Finally, cultivating the capacity for scientific breakthrough requires reforming how students are educated since an early age. When asked how he became a scientist, Nobel laureate Isidor I. Rabi credited his mother, who never asked what he learned each day, but instead asked: "Izzy, did you ask a good question today?".

While formal schooling emphasizes building up encyclopaedic knowledge of what is, educators should simultaneously cultivate counterfactual knowledge. Nurturing

a student's ability to think what else *might be or might have been* preserves the innate curiosity and imagination that formal education too often stifles.

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