

*A glossary of terms has been included in the footnotes of this article, in order to improve accessibility and readability. Footnotes in italics provide useful definitions and context.*

Despite aspiring to a purely aesthetic “interactivity,” the puzzle possesses an essentially passive and literary nature. By this I mean, divide the medium of puzzles into its participants, and one finds: the *puzzler*, that is, the receptive party, who reads, ruminates on, and ultimately resolves (or abandons) the puzzle, and the *author*, who conceives of the puzzle, plots its mechanical course, and, if they are a good author, accounts for heuristics, the reader’s previous experience of puzzles, individual psychological differences, and so on. This, I suppose, is why I find myself assessing puzzles in the language of poetics.<sup>1</sup> The Puzzle may be less characteristically inclined toward semantic obfuscation, i.e. less inclined toward “poetic” language, but this merely qualifies it as belonging to the more communicative, and less experimental, part of literary media. Specifically, I find myself attracted to implementing poetics in the literary sense. Poetics does not exclude pictorial elements such as illustration, and may indeed rely on it for semantic purposes, and yet gives primacy to *semantics*, as does the puzzle. Thus the puzzle shares a similar relationship to poetics as do literary media. It carries many of the attendant properties of literary artworks, including the co-creative properties which problematize the above “monodirectional” character, all of which have been much more thoroughly described elsewhere.

This is obviously an imperfect metaphor for several reasons. It excludes to a large degree the new-media approaches to puzzle presentation, such as puzzle-based videogames, which have so fundamentally changed the essence of the question, “What are puzzles?” Many of these are the very apogee of the form, and deserve deeper treatment elsewhere. However, to cut to the heart of what the puzzle is, I would much rather limit myself to an atomic form of the art of puzzles and miss elements at the periphery, than over-reach and fail to generate an insight. It is also obviously a product of my own spheres of knowledge. I understand literature and poetics, and prefer literary treatments of media. Pbbbbth if you frankly don’t like it. I treasure my weaknesses. What is more important, we now have a shared language of analysis.

Why do we need to develop a new language at all? I feel the present language of puzzles is defunct, or only partially useful. The party line among expert puzzlers and puzzle authors is that puzzles are merely an esoteric subcategory of constraint processing;<sup>2</sup> that is to say, the instant of finding a solution to a puzzle is merely the proof of efficacy of a particular algorithm of play. We can thus assume that, in this

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<sup>1</sup> *Poetics: the study of literature and communication as semantic and social entities, particularly in the traditions established by the structuralist and post-structuralist schools. “The literary work is a piece of discourse (a text) possessing certain characteristics which make it what it is: a literary work. As a piece of discourse it is accessible to all the speakers of a language; its qualities can be observed and classified... by reference to the text itself. Thus a systematic... study of literary works is possible.”* Stein Haugom Olsen, “What Is Poetics?” *The Philosophical Quarterly* 26, no. 105 (1976): , accessed June 3, 2019, doi:10.2307/2218864.

<sup>2</sup> *Constraint Processing: a field of computational theory which deals with Constraint Problems. These are defined by Rina Dechter as possessing two properties; 1) variables with a known domain, and 2) constraints, or, limitations on the values the variables may have relative to themselves and each other. For the layperson, we could also describe this as: algorithmic design for solving clearly defined problems.* Rina Dechter et al., *Constraint Processing* (San Francisco, CA: Morgan Kaufmann Publishers, 2011).

model, an *unsolved* puzzle would be the inverse: the puzzle as a proof-of-efficacy awaiting an algorithm. The most effective algorithm is that which completes the puzzle in the smallest number of “cycles,” which is in this case a euphemism for the more complicated matter of human cognitive effort. In the constraint-processor model, the puzzle is merely a task, in the sense of a set of data intended for computation. Unlike real-world computation, however, it is a set of data designed around the properties of the algorithm, not an algorithm designed around the properties of the set. I reject this model, for the following reason: a human isn’t a machine. This may seem soooo obvious. However, I feel the unspoken ideological elements of the constraint processor model have been sufficiently seductive to the modern imagination that we may have overlooked the obvious. Specifically, I am referring to the late-capitalist imagination - after all, if the human may circumstantially transform themself into a machine of labour, for fiscal survival, why not a machine of thought, for pleasure? The neoliberal conceives of both labour and the labourer as overly simplistic. But much like all elements of the late-capitalist imagination, it is founded on a contradiction: that second element, *pleasure*, or rather the possibility of pleasure, thwarts the constraint-processor model.

A machine (our constraint-processing algorithm) possesses no extrinsic faculties. Its entire being is interior to the task; without the task, the data set, the algorithm evaporates. A search-sort algorithm with a perfectly sorted set does not ask itself, “did that set fulfil my personal needs?” An algorithm is not particularly existential about its work. An algorithm without a task is a non-thing. It simply dies, like a worker bee separated from the hive. Except, of course, bees are fun and have hobbies, like dancing. An algorithm’s existence consists of its function. The puzzler, on the other hand, approaches the puzzle to settle some biopolitical<sup>3</sup> imperative. They also depart the puzzle with new properties and characteristics; in the case of the “best” puzzles, these alterations may even be profound, a shift of perspective, a realization of the beauty of structures which before appeared banal. So the constraint-processor model is bunkem, by my reckoning. So I prefer the literary model.

Fields of poetics, like literature, are defined by the intended uses of the genres in which they are deployed. Literary genre is also described by use, as well as social and political situation. For example, romance is described by the biological imperatives evoked, as well its situation within the context of an audience which seeks out parasocial connections with the characters described. Erotica is further isolated as a subgenre within Romance by the presence of a specifically sexual biological imperative, which is treated in a particular culturally defined manner which makes it not merely “romantic.” Like romance, the puzzle also evokes a certain biological imperative, and is situated within a certain community at a certain social and semiotic locus. This functionalist process of analogy to similar deployments of poetics, I feel, is worth pursuing when it comes to finding a useful analogue in the poetic genres for the puzzle.

Despite the preponderance of the constraint processing model, the puzzling community is paradoxically highly aware of this biological imperative. The social milieu of the puzzler, (primarily but not exclusively anglospheric, minority-world, neoliberal and, typically, university-educated) speaks of the puzzle as a tool of “self improvement.” One does not solve a puzzle for its own sake. One puzzles to maximize one’s

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<sup>3</sup> *Biopolitics: A field of political philosophy dealing in the relationship between the state and the physical and mental bodies of the population, such as the defining of normative sexualities, the role of labour, the policing of access to medical care, etc.* Michel Foucault, *The Birth of Biopolitics Lectures at the College De France, 1978-1979*, ed. Michel Senellart (New York: Palgrave Macmillan, 2011).

efficacy in the role of puzzler. That is to say, latent in the labour of the author is the assumption that the puzzle is but one manifestation of a continuity of puzzles; in the parlance of post-structuralism, all puzzles are structurally contingent upon one another. The puzzler, too, is structurally contingent. Each puzzle is an act of self-modification, which is to say, self-pedagogy. But it is an act of self-pedagogy which is thoughtless, passive, an inductive process. The path to greater puzzling efficiency is paved with puzzles; no other path exists, because they are precluded by the need for “difficulty,” which is the alienation of the puzzle from the pre-existing heuristics of the puzzler. A “good puzzle,” according to the puzzling community, forces the creation or extension of a new heuristic, utilizing familiar heuristics in its makeup. Or, to put it in familiar language, it “pushes what you know, but is achievable.” Thus each increase in difficulty further removes the constituent heuristics from anything but the *institution* (in Bernard Suits’ sense of the word) of puzzles itself.<sup>4</sup> Puzzling, like chess, consists entirely in the *institution* of puzzling. A perverse pedagogical relationship arises between puzzler and author: the author’s tutelage operates only upon itself. A lesson reflects only on previous lessons. The puzzler who inducts exterior knowledge into the tutelage they receive, is an inefficient puzzler; they muddy their knowledge with inadequately compatible data, and so waste cognitive time and labour. Perhaps this is the origin of the constraint-processing fallacy. The algorithm evaporates without a set on which to work; the puzzler-qua-puzzler evaporates without the tutelage of the author. The puzzler is not limited to the scope of the puzzle, but the *role* of puzzler, is.

And now, an object lesson. Martin Gardner<sup>5</sup> is my own very personal favourite puzzle-author; their preciousness, benevolence and kindness is a virtue to which I must admit I aspire. I savor the sweetness of his pedagogy, the old-world scientific triumphalism and its naivete, the gormless social conscience; the secret loveliness of his children’s books, which is perhaps also secret vulnerability of a fairweather Christian apologist. I say all this to soften the coming blow. Though I may have been born too late (thank god) for the hey-day of “Mathematical Games,” the discovery of these old Scientific American “funny pages” has been a constant pleasure. Viewed as poems, they are some of my favourites, easily as conceptually rich as Mallarmé or e. e. cummings. “Poetry,” to me, is merely all that is defined by the possibility-space of poetics, or otherwise, that which is structurally defined by its relation to poetics. It is inadequate for our purposes as a genre-identifier, but enlightening as a descriptor.

Gardner is talkative with regard to his own thoughts on these “poems.” His thoughts are very rich. He too sees them as essentially works of practical pedagogy. “For 40 years I have done my best to convince educators that recreational math should be incorporated into the standard curriculum. It should be regularly introduced as a way to interest young students in the wonders of mathematics. So far, though,

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<sup>4</sup> Bernard Suits defines the “institution” of a game as: *the constitutive parts of that game which may be separated from, but which are required for, the playing of that game. In this case, I have applied the term to puzzles, which Suits would define as “one-player, one-actor games.” Suits uses chess as an example: “One [can] simply set out the pieces in such a way that Black has White in checkmate. Such ‘descriptive’ checkmate does not, of course, signal anyone’s victory at chess, since it was not the result of playing chess... There is, I think, an institution of chess which can be distinguished from any one game of chess.”* Bernard Herbert Suits, *The Grasshopper: Games, Life, and Utopia* (Peterborough, Ontario: Broadview Press, 2014).

<sup>5</sup> Martin Gardner (1914-2010) is best known as the author of *Mathematical Games*, a column which ran in *Scientific American* during 1956-81. These are credited with popularizing Recreational Mathematics as a pastime. Gardner was also a prolific writer and journalist, whose work included scientific skepticism, philosophy, religion and literature.

movement in this direction has been glacial.”<sup>6</sup> What other poetic system is so contingent upon the presumed mental plasticity of the reader, and the objective of altering their mental constitution? I can only think of two: 1) Education. This is the field of poetic operation to which Gardner aspires. But, they acknowledge that they have not been welcome. I stand with the teachers. Puzzles are *peripheral* to true education, but not capable of encompassing its intended outcomes. Education (at least, benevolent and progressive education) seeks to employ an open-ended methodology. The whole person is brought to bear on the examination of a notion, allowing for free and personal reflection and criticism, as well as the internalization of a set of data and methods. Puzzles seek to “teach” us to *do* puzzles, and *how* to do puzzles, but are deliberately ignorant of all which is extrinsic to their institution. Education seeks to teach *of* things, and embraces the extrinsic. A puzzle is wholly endemic. A puzzle may reinforce a method, but not teach a lesson.

Another definitional quality of puzzles: they possess solutions. The solution is created simultaneously by the author with the correct methods which will guide us to the solution. They must be an operation of the solution, or, both must be operations of each other. The correct process of solving *is* the solution. Thus all epistemes<sup>7</sup> within puzzles are like the plots of detective films, as they were once described by Marc Augé: “In the logic of the police thriller, [past and future] are confounded: the past has to be examined to find the solution, and the various vicissitudes which may arise during the investigation (other murders, false trails, assorted suspects) find their definitive explanation there. The police thriller is not written in the past, or the present, or the future, it conjugates all three.”<sup>8</sup> The puzzle is a false act of discovery, which can discover only itself. The puzzler is spoiled rotten with a sugary flavour of their own ingenuity, but the act is in fact one of passive reception.

The only poetic analogue which is available to my mind is 2) Propaganda. Propaganda is a pedagogy which seeks only self-proliferation. Self-proliferation is opposed to the full suite of examination, which must by its nature include methods which are *extrinsic* to it, and so undermines its hegemony over time. It can only permit that which is compatible, i.e. that which is *intrinsic* within it, or its own institution. It teaches only its own knowledge, encourages the atrophy of extrinsic methods of thought. It is inductive, and opposes deduction. Its every criterion reaches up to touch us, when we observe puzzles. Even more asphyxiating: propaganda cannot live within the works of a single individual alone. It must hail to a larger ideology, or, at the least, is strengthened considerably when it can do so. Political propaganda hails the state; religious propaganda hails the church; puzzles hail their own institution. A puzzle is unintelligible without the institution of puzzles, much as the phrase “Workers of the world unite” is unintelligible without Leninism. Paramount to the puzzle-institution: hierarchical progress *through* the institution, which is defined by the puzzle-institution as improved efficacy in puzzle-solving, as we

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<sup>6</sup> Martin Gardner, "A Quarter Century of Recreational Mathematics," *Scientific American*, May 29, 2010, , accessed April 2, 2019,

<https://web.archive.org/web/20111017071246/http://blogs.scientificamerican.com/observations/2010/05/29/a-quarter-century-of-recreational-m-2010-05-26/>.

<sup>7</sup> *Episteme: a method or system of knowledge-making (epistemology)*. “I would define the episteme retrospectively as the strategic apparatus which permits of separating out from among all the statements which are possible those that will be acceptable... and which it is possible to say are true or false. The episteme is the ‘apparatus’ which makes possible the separation, not of the true from the false, but of what may from what may not be characterised as scientific.” Michel Foucault, *Power/knowledge: Selected Interviews and Other Writings 1972-1977*, ed. Colin Gordon (New York: Vintage Books, 2015), p. 197.

<sup>8</sup> Marc Augé and John Howe, *The Future* (Brooklyn, NY: Verso, 2014), p. 13.

observed before. Hence it is not just the individual puzzle, or the individual puzzle author's oeuvre, but the entire genre of puzzles which is self-inclined, which inducts only those principles which reinforce its own methodologies. This may be seen as a revision of our earlier definition of puzzles as being purely intrinsic; each is entirely intrinsic in its solving-process, but also, require the puzzler to be equipped with methods from the *body* of puzzles which is itself wholly self-facing.

So, the essential quality of puzzles is this: "A puzzle inclines us away from open-ended thought, and toward the thought-methodologies particular to puzzles as an institution." Another way to put this: "*Each puzzle is an episteme, which inherits properties from the episteme represented by the institution of puzzles; participation in puzzles and efficacy as a puzzler increases as one gains facility in this episteme through induction of its principles, but also, requires that one temporarily refuse all other epistemes.*" This is very similar to a poetic definition of propaganda: "*A poetic genre which induces the audience to adopt a given ideological episteme, and temporarily or conditionally refuse others.*" There it is!!!! Our analogue!!!! Parfait!!!!

From this we can assume that, like propaganda, puzzles also act, perhaps intentionally, on the mind of the polity. Each puzzle we succeed in completing is not a benchmark of increasing of mental "power" - whatever that means - but a gradual tightening of observational and inventive capacity. The puzzle is radically separated from open-ended forms of pedagogy by its enclosing, rather than expanding, nature. Much as Foucault's Justicar manoeuvres the citizen towards imagining the punishment as though it were simultaneous with the crime,<sup>9</sup> the puzzle manoeuvres the puzzler towards seeing all problems as simultaneous with the received episteme of puzzles.<sup>10</sup>

Yet puzzlers often allude to the ecstatic pleasure of "surprise," and its bedfellow, "discovery," which I mentioned earlier. This is simply the strictly *intrinsic* methodological nature of the institution of puzzles dressing itself in the clothes of the *extrinsic*. When the puzzler is "surprised," they note that they have crossed an epistemic boundary. That episteme which they previously held did not contain the entirety of the puzzle with which they are engaging, viz. its full solving-process-and-solution complex. Its resolution required something not yet possessed. That does not, however, mean that the "discovered" element was outside of that complex, but merely that it was momentarily outside of the puzzler's internalized repertoire. In this sense, the sensation of "surprise" is simply a manifestation of incompatibility, and its resolution, the resolution of a property of the puzzler extrinsic to the properties allowed by the author. A skilled author is one who is aware of the limen, and frequently uses it to cognitive-behavioral effect. The pleasure of such a sensation is a powerful motivator, beloved by the puzzling community. Even if a

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<sup>9</sup> Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. Alan Sheridan (S.I.: Vintage, 2009).

<sup>10</sup> An aside: If you'll allow me to step for a moment outside of my usual purview, I might also add that if puzzles are the "propagandistic" arm of play, mathematical Realism is the propagandistic arm of mathematics. The self-inducting episteme, the atrophy of extrinsic methodologies, the institutionalization – all are present. Both consist of a logic which can refer only to itself, but which compels all objects to be treated as though it precedes them.

An aside to the aside: this leads us to a contradiction of terms. With mathematics-as-propaganda on one hand, and education-as-emancipation on the other, is education in mathematics propaganda, or emancipation? I answer: both. It is a natural property of language to fail to uphold the clear distinctions of the logical operations we try to deploy in philosophy and critical theory. Grammatical clustering and its consequent contradictions are a manifestation of this property. It is my opinion that disentangling this conundrum does not undermine the point, but instead points us towards a much deserved skepticism towards so-called truth and the structure of speech. But better minds have already addressed that.

puzzle requires a puzzle to fully appropriate a methodology they could not have divined from the puzzle itself, recall that it is quite possible to “jump tracks” but never to leave the slot car race entirely. As long as we are still within the institution of puzzles, one may move to a new episteme within it and still continue down the path toward “efficient” puzzling, hence towards the goals of the institution. Remember also that the fate of any knowledge which is not inclined toward greater efficiency within that institution is doomed to atrophy; it is a dying arm of the tree of the puzzler’s methodological life. This does not mean that the puzzler can’t also have other hobbies, but rather that when they put on their puzzling-hat, all other non-puzzle thoughts are temporarily suppressed.

For a time, I was fairly fucked when it came to the question: what is the pedagogical inverse of the puzzle? Or rather: if the puzzle is an object for the de-potentialization of the epistemic self, what, if any, existing class of objects embodies the opposite, is dedicated to the open-ended education of the puzzler in methodologies non-intrinsic to itself – even, that its author couldn’t conceive? I could imagine such an object, or design it myself, in some fumbling over-theoretical way, and probably make something satisfying to no one but myself. But this would not be so demonstrative of the realness of the project, of its existence in the world *a priori* to my thesis. If it did not exist in this big ol’ world, perhaps I was simply up in my head? A head in the clouds? Fortunately from my cloudy brain, I stumbled across an obscure bit of design history at just the right moment.

The pedagogical inverse of the puzzle is the *Froebelgaben*. I do not have the space or the time or the patience to explain the fascinating history of these objects, but in summary: these ingenious precursors to modern wooden blocks, legos, and other creative toys, were designed and commissioned in the mid-19<sup>th</sup> century by Friedrich Fröbel, founder of the first modern kindergarten, differentiated from the creche or the governess by its focus on early childhood education, as opposed to care. In essence, the set of *gaben*, or “gifts,” consist of several “grades” of toy, from simplest (six balls of yarn in primary colours) to most complex (a set of irregular wooden building blocks, including planks and triangular prisms). The child was expected to graduate from one grade to another in sequence, experiencing through play the increasingly complex physical properties of the *gabe*, contextualizing the objects in a way unique to themselves, their perceptions and environments – that is to say, applying extrinsic methodologies in a process of synthesis, reflections and recontextualization – teaching without propagandizing.<sup>11</sup>

The operations of the *gabe* are wholly extrinsic; it possesses properties, seductive properties of visual simplicity and satisfaction, tactile seductions, such as weight, heft, texture, softness and hardness, all designed to draw the attention of children. Both the *gabe* and the puzzle possess these seductions, but the properties of each reflect their character as social artifacts. The puzzle seduces through affordances which result in authorially constructed action. For example, the Rubik’s cube’s hinged design leads the haptic explorer eventually to try rotating the faces, which leads them to the realizations that the colored blocks can be aligned, can be made congruent, that the whole machine can be made congruent, QED. We are seduced by the humanness, rather than the object-ness, of the puzzle. It reflects ourselves back to us. We see in it something comforting and understandable: ourselves. Like the Numenal Realist, we are gradually convinced that the artificially human characteristics this most unnatural object has

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<sup>11</sup> See also: Peter Weston, *Friedrich Froebel: His Life, times and Significance* (Roehampton: University of Surrey Roehampton, 1998). Available as a free pdf from The Froebel Trust, <https://www.froebel.org.uk/resources/froebel-s-gifts/> as of 04-06-2019.

inherited from its author are indeed universal to all objects; or at least that we can immerse ourselves in such a world, within the scope of the puzzle. The *gabe*, on the other hand, cannot rely on the pleasures of reflecting the puzzler's image, cannot be seduce with the vainglory of human self-aggrandizement. It is unauthorial, possesses only natural operations, can only hope to embody the aesthetics of a call to action, not to be, in itself, and entré into action. Its extrinsic characteristics belong to the puzzler, are brought with them to the act of puzzling, or discovered in play with the *gabe*. Like building blocks, the *gabe* acquires a relationship to the puzzler only when the puzzler brings to it actions and perceptions which are their own.

It may well be for exactly these reasons that the *gabe* has not had greater popularity among puzzle authors. The *gabe* has a more limited power to motivate, except aesthetically, and thus cannot artificially extend engagement. The puzzler decides when play is concluded, not the author. Authors find it completely devoid of penetrative or coercive properties, and therefore shun it – they cannot abide being stripped of power. Implicit in the hubris to create is the hubris to believe one knows better than the audience; there is nothing wrong with this very benevolent hubris, but it rules out many possibilities and ways of thinking. The puzzle, like the panopticon,<sup>12</sup> is as seductive to its creator as its victim. But the alternative is oh so much nicer. An extrinsic possibility space is also an infinite and uncoercive possibility space. This space is of course still pedagogical. Whereas the puzzle states: “here is a heuristic path to the ideology of the author,” the *gabe* merely states: “here is a heuristic path to nowhere specifically.” The graduation from level to level within Fröbel's system attests to the possibility of a growth-curve in the capabilities of the puzzler. The more properties of matter the child understands – understands, rather than *is taught in what way to understand* - the more methodologies and operations of themselves they learn to bring to bear upon objects, the more refined their methods become, the greater their need for more specialized objects. Without being propagandized, the puzzler learns, develops facility and understanding.

The *gabe* refuses propaganda. It has little or no control to exert over the puzzler. Its ability to teach relies upon its power to direct attention.<sup>13</sup> It requires a new type of author-designer – or perhaps, a designer, not an author. It is no coincidence that Fröbel's theories inspired the instructors of the Bauhaus.<sup>14</sup> To design the *Froebelgabe* is to deny oneself authoritative power, which is a selfless and difficult act, particularly for those raised in the tradition of coercive pedagogy. I admit, I hardly know what to do with myself without the power to influence, to dictate to the unwilling or unsuspecting pupil. Our freedom must not be held above that of others. Very difficult. But it must be done. By sacrificing authority, we are bulwarks to authoritarianism.

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<sup>12</sup> *Panopticon*: Originally conceived by English utilitarian philosopher Jeremy Bentham in the 18<sup>th</sup> century, a prison designed around a wheel-and-spoke system such that prisoners can be observed at any time, but cannot tell if or when they are being observed. The term was later re-purposed by Michel Foucault to refer to all forms of observation which aspire to alter the behaviour of the observed, which is now the more common usage. Foucault, *ibid*.

<sup>13</sup> Pretending that this is the ultimate expunging of bias in pedagogy would be an obvious falsehood. For an exploration of how this process may also result in forms of injustice and social manipulation, see Miranda Fricker, *Epistemic Injustice: Power and the Ethics of Knowing* (Oxford: Oxford University Press, 2011).

<sup>14</sup> *The Staatliches Bauhaus: a school of art and design established in 1919 by Walter Gropius et al, and subsequently closed in 1933 due to the political turmoil in Germany. Largely credited with the shift toward modernist design, and with popularizing design as an intervention in human life.*