



Hydrotopias and waterland

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*When you work with water, you have to know and respect it.
 When you labour to subdue it, you have to understand
 that one day it may rise up and turn all your labours to nothing.
 For what is water, children, which seeks to make all things level,
 which has no taste or colour of its own, but a liquid form of Nothing?
 And what are the Fens, which so imitate in their levelness the natural
 disposition
 of water, but a landscape which, of all landscapes, most approximates to
 Nothing?
 Every Fenman secretly concedes this; every Fenman suffers now
 and then the illusion that the land he walks over is not there, is floating...*

(Swift 1992: 11)

What is water? This a question I have asked with a degree of increasing obsession over the last few years. It started randomly, from the dissatisfaction provoked by a book with this very title. As soon as I started my teaching career, soliciting students' responses to this question in front of an empty blackboard on the first day of class became my go-to activity, organized in a variety of ways, from personal reflections to roleplay games and group exercises. Then it expanded to distributing blank cards at conferences and guest lectures, as well as pestering fellow travelers who had dared to initiate a conversation on a train or a flight. I never thought—and I still do not think—about this as research, but more as an enjoyable empirical exercise that led to some interesting conversations and occasional follow-up coffees. My “what is water” notebook shows that I have posed the question to my plumber, greengrocer, IT provider, old friends at reunions, neighbors, and kids' friends' parents. To anyone brave enough to start to chat, really. A mania: the more answers I got the more often I asked it. I kept at it precisely because the answers I received were strikingly similar—an accumulation of uniformity that defied the ordinariness of the question. When I systematized my notes into an excel file, I realized it had bloomed into a sustained enquiry.

Respondents were randomly chosen, but with a strong bias to the kind of people I meet. While it included people from approximately two dozen different professions, almost half of the respondents were students, a good portion of these from universities that are considered elite in their respective countries. I often noted the context in which the question was raised. Of course, many of my interlocutors—primarily

students and colleagues—knew that I study water before answering the question, but most people I spoke with know me through my other social roles: the inhabitant of house 487, my kids' mother, a volunteer at an environmental cleanup, a rowing mate, an NGO supporter, a pro-bono yoga teacher, a co-participant in a course or social activity, etc. When asked, I represent myself as a student, a teacher, a writer. Occasionally an anthropologist or a geographer, the author of an upcoming book on floods in India. After discarding a few incomplete or biased answers, I compiled 232 responses. Although this compilation will be only the prompt, not the evidence, for this introduction, I admit that I found the aggregate answers revelatory.

Questions are not neutral either—they often comprise the answer as much as social relations condition it; so let me share the questions I have used. I mostly ask for a personal take on “what is water?” such as “in your opinion, what is water?” or “what is water for you?” Conscious of the charged meaning of the idea of a definition (Cortesi, 2021a), I avoided terms such as “define,” “definition,” and words that refer to codified learning such as “know” and “knowledge.” When the context felt intellectually loaded, or the question was not answered spontaneously, I would rephrase it as an opinion on common sense, such as “if I ask people in your family what water is, what would they say?”—a depersonalization strategy used by epistemologists who study empirical research (see Bicchieri, 2017).

The most relevant result of this unorthodox survey is the following. Over half of my respondents classified water as H₂O. When I could follow up immediately, I asked those who mentioned the chemical compound to also supply formulas for more than two other molecules. Less than 1/5 of those who were asked to do so wrote down three other molecules, a proportion that decreases to 1/10 if I exclude university students from the respondents.

Apart from this first observation, I have focused my attention on answers that contain at least 3 words. Two third of these “elaborate answers” mentioned the word “liquid,” “fluid” or “flow.” Two thirds of the same subset mentioned a positively-connotated noun or adjective, such as “life,” “pure,” or “vital/essential/crucial for life” or something similar. Around 1/5 of the “elaborate answers” also mentioned lack of color, odor, taste or shape, a virtuous *quality of absence*. Only a handful of the 232 respondents attached the possibility of a negative meaning to water with adjectives connoting strength, such as “powerful” or “mighty.”

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Why did the large majority of the people in this exercise define water—arguably the most mundane substance they encounter daily, the substance that constitutes the majority of their body—by using jargon—that of chemistry—that they do not otherwise know, a language that is neither realistic nor useful, and not even formally correct? And why do people attach exclusively positive meaning to the idea of water, when our days are filled with news and images of destructive floods and the health effects of drinking toxic water?

I do not have the answers to these questions just yet. But reflections on this experience lead me, in this introduction, to argue that unraveling these *hydrotopias* is work to be done by scholars of water, work that the essays in this Special Issue begin to do. I am not interested in changing the words people use, but I am invested in attending to them. Understanding how people think about water is crucial work in times when water has become a curse as much as a blessing, a cause of distress and puzzlement as much as it is essential for survival and pleasure.

In what follows, I will discuss a few of these clichés. First, water is not a pure, colorless, odorless, tasteless matter, and it is counterproductive to think about it as such. Second, water is not a flowing liquid, and the idea of water as flow is problematic. Third, water is not even H₂O. These *hydrotopias* say more about the *interpretant*,¹ or the society from which such a definition derives, than the semiotic object itself. Throughout this paper, I will also reflect on what it means to ask “what is water”, as well as propose the concept-word *waterland*, and explain when and how it is a useful means of understanding the world around us.

1. Water is...

Linton says that “water is what we make of it” (2010). The most puzzling aspect of this social constructivist definition is the ambiguity linked to the verb “to make of” (something). Certainly, water is sufficiently malleable to help make things, to become a half a kilogram of bread, or this journal, each print issue taking 800 L of water to construct.² Of course, water means different things to different people, but there are common cognitive patterns and underlying mechanisms worth exploring, as this introduction attempts.

In the rest of Linton’s book, and his production during those years, it becomes clear that his intention is to center water as a social substance whose life cycle is dependent on, and part of, society’s processes. Linton’s definition is situated in a poststructuralist framework that seeks moments of slippage among older pretensions of naturalism or systematicity. By contraposing the solid verb “is” to an ambiguous object, however, this (non-) definition only partially confronts the indeterminacy left by deteriorating structures of shared meaning. It belongs to a time in which scholars were preoccupied with asserting the inseparability of nature and culture, and points towards the human presence in constructions of naturality. It results, however, in substituting “nature” with a similarly abstruse “society” (Camargo and Cortesi, 2019).

Yet this sentence says something else that calls for further attention. It says that water can be anything. But it is not—defining water as what we make of it reveals an illusion of control that is as useless as it is dangerous. The view from other places of the world such as my field-work area in India reveals that water is precisely what we cannot control. I foresee that many other places on the planet, including the country from where I write, The Netherlands, that prides itself precisely on such expertise, will shortly come to the same realization, which perhaps wasn’t clear when Linton was writing in the early 2000s.

My own work in North Bihar, a place of climate change anticipation, examines the disasters of water that people have lived through for several decades as problems of knowledge (Cortesi, 2018a). How does the experience of increasingly disastrous water change what we know

about water, and thus about our world? What makes people resilient to disasters, and enables them to learn from one difficult environmental event to prepare for the next one? Having lived myself under several disastrous floods, in Bihar and elsewhere, I cannot refrain from hoping that the rest of the world can learn new ways to deal with water from Biharis, virtuosos of living in disastrous waters. Biharis, but also the inhabitants of Bolivia, Estonia, Indonesia, and Colombia, whose experience and struggles are discussed in this issue, have plenty to teach the rest of the world about the difficult *waterlands* they inhabit.

2. Waterland

Water seems to capture the imagination for its alleged or potential purity, understood as the absence of contamination and freedom from other substances. Color, taste, and smell are the sensorial qualities used to define all sorts of matter, as discussed by Hegel (see Rockmore, 1997), yet water is the one substance for which the absence of color, taste, and smell is considered its essential quality.

I suspect this tension towards purity may be an obstacle keeping us (with us I designate here the community of speakers who uses the idea of water as opposed to that of soil/land; see Cortesi, 2021b) from other conceptual possibilities. I would like to posit water as the anti-purity matter, as the solvent *par excellence*, focusing not on the teleological aspect of water as the cleanser that ferries us to purity, but that which inhabits, assimilates, and transforms other substances, the matter that breaks down the solidity, physical but also energetic, of other matter. Why do we not consider water as that which blends itself with things, at times becomes other things, an integral or often essential part of matter? Perhaps because there is no threshold of water composition that maintains the ontological property of being water—the human body, for example, primarily composed of water, is never called a waterbody. How should we name things that are chiefly composed of water?

With the term *waterland*, I propose that soil/land is, in many cases, not sufficiently separate from water to justify an oppositional ontology.³ One of the answers to the question, collected after the opening class of one of my first thematic seminars, offered a poetic definition of water: “Water is what begins where land ends.” I distinctly remember sitting down in an empty room and staring at the paper—a simple handwritten note conveying such an evocative message. I remember wishing I had given the students more chance to talk about this. I even imagined hypothetical comments from my friends in Bihar—nothing more at odds with water, they would have replied. Yet, this time I would have defended the students—this is what is represented on a geographical map, this is what many of us learned in school: after the green, there is the blue, separated by a definite, definitive line.

Waterland is not mud—it is to mud like land is to soil, and yet it does not have to be composed of mud like land is made of soil. Contrary to mud, that refers just to the specificity of the matter, waterland indicates an expanse, possesses extension. Waterland is not a hybrid, a position entertained by Swyngedouw (2006) and then by Lahiri-Dutt (2014) (see Krause, this issue), but a compound term created by joining two words for a completely new meaning. I have proposed the water-land relation as ecological (Camargo and Cortesi, 2019), ontological (Cortesi, 2021b), semiotic and political (Cortesi, 2018b), and cognitive (Cortesi, 2018a). I propose it here as an epistemic and chemical connection. Some of the articles in this special collection take a more cautious perspective, while others argue, as I do, for the futility of systematically separating the two. For Whitt and Krause, as well as Ingold and Harris, it is *rhythm*, therefore a function of time, that connotes the water/land nexus, a position based on the idea of place as a spatiotemporal category. For Ley it is in stagnation, the spatiotemporal event of non-flowing water. For Camargo it is a nexus, an analytical device that shows the close relationship between land, water, and property.

¹ The use of interpretant refers to Pierce’s triadic theory of sign (1931).

² See the water footprint calculator, accessed at <https://www.watercalculator.org> on January 1, 2018.

³ For my understanding of ontology, see Cortesi, 2021b.

With these dialectics in mind, I invite the reader to consider the dual epistemological and linguistic problem at the root of the question “what is water?” The anthropological enterprise expects us to engage with and listen to our interlocutors on their own terms. What do they use the word “water” to mean? What is/are the word/s which we translate as “water”? Is there anything that gets lost in translation? The question I borrowed from Linton does not begin to get to the question of what people use these words for, or how they understand and imagine the liquids, vapors, and solids they bathe in and drink and irrigate with and hope for and fear and labor to drain away.

My research in North Bihar led me to problematize the meaning of words used to refer to “water.” I write about the ontological overlapping of water and land, which I find to be two sides of the same coin, one included in the other, an understanding shared by the majority of those who live close to the rivers of the Northern alluvial floodplain (Cortesi, 2021b). Yet, many Biharis also know a form of “modern water” that is not as abstract as Linton’s, and that they define as “bottle water” even when it is not found in a bottle. They also know *jal*, a more formal name for water (otherwise mostly called *paani*), whose value, sacredness or purity has nothing to do with the presence of other molecules or organisms (see *nadi ka jal*—river water, as opposed to *nadi ka pani*). *Jal* is not necessarily cleaner than *paani*. The value of *jal* depends on its source (see *bhoojal*—groundwater, or *Gangajal*—Ganga’s water), unless another name is juxtaposed to *jal* (see *jahnikaas*—drainage). Through the activities of the NGOs with whom I work, the inhabitants of North Bihar have also come to take into account the potability of rainwater, whose harvesting has sensorially and cognitively challenged their thinking about water in general (more in Cortesi, 2021b).

How many waters do any of us know, use, enjoy, imagine? This question is more philosophical than it sounds. To discard the possibility of psychological solipsism, which is to say that meaning is internal, without reference to the world outside, Putnam poses the example of a twin planet (Twin Earth) where a different substance looks like, and is called, water. What is water, Putnam seems to suggest, if we can call water something which is not water at all? The philosopher is not willing to give up a theory of truth: he thinks there is a certain correspondence between meanings and reality. For an anthropologist, Putnam is missing something: without having to go to Twin Earth, he could take into consideration the many meanings of water right here on Earth, or even the possibility of the many meanings of water in one single community. He could take into consideration that meanings may be neither in someone’s head nor out there in reality, but instead in the intimate and collective practices and conversations among people that share some understanding of water (Putnam, 1975).

Does it matter if the many waters we know are called by the same name? To a certain extent, in the era of extreme consumption of nature, calling it all water could help in recognizing its finitude. For the same reason, though, we should enlarge our practice of naming watery matter, which justifies the need for names such as “waterland.” While it may not be necessary to invent new jargon, it is analytically useful to discuss and specify names to empower the conceptual and practical work of attending to differences.

Mary, a respondent to my improvised survey with whom the conversation continued, told me about her stunning family house, mere inches from the Mississippi River, whose water she could photograph so well from the window. When I told her that I suspected her house wasn’t close to the Mississippi but was *on* the Mississippi river, her eyes widened: “Is that why the water runs into the garage despite barriers? The garage is away from the river, so we didn’t expect that!” I told her about the invisible parts of the river that scientists call hyporheic. Then she showed me pictures of the house and I asked her if any part of the structure felt less stable. It then became apparent that the porch, a supporting wall, even part of the garden, were all sinking. The pictures, furthermore, showed something unusual. If on the left side of the house, lines—think the roof, the wall, the windows, the door—were parallel or perpendicular to the horizon, that wasn’t the case on the right part of the

house. The house seemed to be plunging down on that side. Mary was stunned. But, she insisted, her land was not in the floodplain. I recognized that the language of scientists may sound less credible than the insurance map. Is there any other way, apart from insurance classifications, that would help people take the river seriously?

What name can we give to this land, I kept thinking, in order to make Mary and others realize its peculiarities? “Wet land” would not have convinced Mary—her plot wasn’t wet, nor a wetland. Can we make it linguistically easier to explain phenomena such as land subsidence, and to empower communities to reserve specific areas to temporary activities instead of long-term construction and related investments? How can fluvial management approaches such as the Dutch “room for the river” or “fluvial zoning” (the first criticized egregiously by Moreno Quintero and Selfa, 2021; Roth et al., 2021; the second, discussed in Cortesi and Westerkamp, forthcoming) or perhaps more creative, socially just, and environmentally respectful versions of those? To help recognize the specificity of certain landscapes, I borrow the word *waterland* from Graham Swift’s novel on the British’s Fens (Swift, 1992).

Unlike marsh, bog, and swamp, *waterland* does not describe a specific ecology. It is not scientific jargon like “vadose” or “hyporheic”. Like land, it refers to a plot as well as to a more extensive, and even abstract, geography. When I asked my students in the Environment and Sustainability Program to point at the contours of the Mississippi river in a map of the USA, they pointed at the 3730 m long blue string that travels from Northern Minnesota to the Gulf of Mexico. No one drew a watershed. When we learned about the entity of the watershed, which extends over most of the U.S.A., and yet it is not even the most extensive watershed of North America, one of my students asked whether the U.S.A., and not only Bihar, was a land of rivers. I acknowledged, instead, that the geography of the U.S.A. is qualitatively different from Bihar in terms of river density—we do need distinctions. Yet, we also need to think about land differently than the solid, immobile entity whose only relation with water is through irrigation.

Camargo, building on Verdery, references the dramatic story of his interlocutors’ struggle to cultivate land born out of water and the abuses of power adopted to possess it, concluding that “land can be as dynamic and shifting as water” and that “[the] permanence [of land] is more of a social expectation than a biophysical reality” (Verdery, 1994; Camargo, this issue). Krause describes those who have instead been able to adapt their economic expectations to the increasing wetness of their waterland, and Ley emphatically attends to the struggles of those whose waterland is a source of microevents, whose aggregate result is all-consuming violence. Whitt retells and analyzes the political narratives about recognizing, and negating, the matter of waterland in its temporal cycles.

Land is an economic expectation, based on the presumption of stability, necessary for property (and taxes), investments (and taxes), markets (and taxes) (D’Souza, 2006; Rose, 1998). With its definit(ive) lines that aspire to solidify the elusive plasticity of waterland, the map flaunts its bidimensional flattening of the third dimension. With its static timelessness that ignores the ebbs and cycles narrated in the articles included in this issue (Whitt and Krause in particular), the question of land’s origins (where does it come from, how does it come into being? asks Camargo) and its future (phrased so poignantly by Ley’s interlocutors, who expect the sea to reclaim the land), a map perfectly serves the illusion of, and interest in, land’s stability.

The term waterland, instead, is *diffused* in capacity and *infused* with time. It displays the boundlessness, unpredictability, nonalignment of a non-geometrical, non-static, multi-dimensional understanding, examples of which are the deltas (Krause), lakes (Whitt), fluvial lands (Camargo), and tidal areas (Ley) in this special issue. This term offers itself to contexts that would benefit from long-term observations and ethnographic engagements with the factors that constitute the geography of a place. Usefully non-jargonistic, “waterland” helps by adding specificity to, and against, some of the common hydrotopias my survey revealed.

3. Stagnation

Many (around 2/3 of the extensive answers) of my respondents defined water as a flowing liquid. The idea of liquid and flow has also conquered many scholars—the metaphor of liquid modernity (Bauman, 2000), wet theory (“which accommodates flux, flows, and other boundary-blurring phenomena at the core of the theory rather than at its reluctant boundaries,” (Appadurai and Breckenridge, 2009: IX), liquid possessions (Bardhi et al., 2012), the city as the place of flows and overflows (Gandy, 2004), just to mention a few. Krause in 2014 invited Strang, Féaux de la Croix, and Raffles to critically discuss the possibility of reclaiming the idea of flow as a useful metaphor in the social sciences, standing for the pure movement of a harmonious kind of water in different directions and tempos. While Krause is wary of flow metaphors “when they portray phenomena that do not actually flow,” he intends to rescue flow to trace the “social and material exchanges through which the world comes into being,” as flow is “a pointer to all the fluxes and circulations” (2014: 90–91). While always risking the danger of being taken too far (Camargo and Cortesi, 2019, Hannerz 2000 in Krause, 2014), metaphors continue to feed poets and scientists alike (Kimmerer, 2013; King, 2019).

Water is intuitively understood as a substance as much as a process—that is why we use it as a metaphor of change, because it intuitively brings closure to one of the uncomfortable dichotomies of the social sciences. But for the same reason, flow is a cul-de-sac metaphor, one with limited epistemic purchase, as it does not go much further than asserting the axiom that things change. Since most social scientists study precisely change, flow does not add much to their intellectual pursuit—we know things change, even things as “stable” as identity, *that which is identical to itself*. Were we to take seriously water flow as a metaphor, we would instead look into the direction in which things change, how and why they change in that direction, the rate of change, what it takes to change along or against the path of least resistance, which ecologies change as a result, and how we understand the emergence of novel conditions.

But here my resistance to flows is not as much about its use in metaphors as in stereotypes. A metaphor is an analogy, a borrowed image used to illustrate something else. A recent exhibition on water recites: “water flows from the tap and you drink it, it bubbles along creeks and you fish in it. It crashes on the beach and you splash in it [...] water is constantly flowing around us, through the natural world of streams, rivers, bays, and oceans [...]”.⁴ These sentences are not borrowing images of water to talk about something else, but they are evoking real yet simplistic images of water. Do we want to borrow the metaphor of flow to explain the globalization of finance, the city or the countryside, the ethos of the modern world, that of the future or that of the past, just about everything that is not hard metal—sure, if it serves the job. But we will miss out if we can only see water as a liquid, if we assume that water is *that which flows*. Certainly, water does not necessarily flow (Stern 2017 cited in Ley, *this issue*). That is a stereotype, a cliché, a simplified conventional image—what analytic value does it serve? So, why are we so stuck on flows?

I am also interested in why an idea takes roots in a certain system and how it transforms it from within (Cortesi 2021a). Linton’s book speaks about how the hydrological cycle, a model, a representation, has become accepted as the real way in which water moves. Plenty of scholars have discussed water flows as forms of depoliticizing water. Water flow depends on a certain pressure, writes Anand about pipes in Mumbai, for example, a pressure which is created through social power (2011). I have discussed how considering water as in a state of flow oversimplifies it as a substance that behaves in cyclical and predictable ways (Camargo and Cortesi, 2019), an assumption which Ley’s and

Whitt’s articles also stand to contradict. To take water as *that which moves* simplifies water, romanticizes it, and thus does not recognize the experience of non-flowing water.

Perhaps we are frightened by flow’s opposite, stagnation, to which Ley attaches a triple meaning: entrapped flow, impeded development, and the time between the flow of life and the death of a system. Ley also points at the English language’s bias toward backwaters as degradation and at hydrology’s pathologizing non-flow. I would suggest here a fourth meaning for stagnation, coherent with the fact that water, with its alleged purity and cleansing properties, is often used as the epitome of morality. As Giblett on slime, stagnation also stands for the rotten, the corrupt, the undesirable (2013). Despite stagnant water being a condition for growth for several species, the idea of it continues to be considered an unpleasant state, which makes flow the coveted alternative. Once more, a metaphor is an idea that engenders a series of consequences (Cortesi, 2021a).

Further, I hypothesize that flow is an important characteristic of water that serves as a connector between humans and nature by sensorially representing nature’s aliveness through visual and auditory changes. Most of the non-animal world is experienced as static: I know plants move but I cannot experience their movement through my timeframe of observation, because my limited sensorium is tuned to movements that occur at a speed similar to my own.

This is of course depending on who is the “we”—which humans am I referring to? The human sensorium, influenced by different practices and circumstances, is not the same for all people—and the most important contribution of my own discipline has been precisely to dismantle the significance of species as a homogenizing category. I will start from myself, then, and explain more about my reasons for this below. Apart from some contemplative stints, I am a superficial observer of nature, occasionally and a glance at a time. I am therefore unable to detect a tree’s movements because they are not comparable to my own. I do communicate with trees, but that mostly feels like a one-way communication. I do not seem to hear much back from them, or perhaps just not through the channels, frequencies, and sonorities to which I am accustomed.

In contrast, I detect water’s tempo, experienced as visual and auditory change. In fact, in the non-animal world, water is the only entity whose tempo matches my own on a regular basis, or whose affordances are perceivable by my sensorium. Water and humans share a present that, as Deleuze would say, is composed of the same micro-pasts and micro-futures. Because moving water is one of the few experiences of the active voice of the non-animal world that we can discern, water metonymically stands for the aliveness of nature, its movement and its voice. The richness of the non-animal world is unveiled through, thus encourages, slow observation. Societies tuned into glaciers or forests, unstable geologies or rainfall—examples of which are commonly discussed in my subfield, environmental anthropology—exhibit specific tempos and sensibilities.

Apart from being facilitated by the history of scientific categorization, I propose that our tendency to cognitively separate and oppose water and land also derives from the different temporalities and sonorities through which we perceive the two, or—to again borrow from Deleuze—a default composition of the past and the future into a static present (Williams, 2011). We are tuned more to water than to land, we associate one to movement and the other to stasis.

Third, I posit that this obsession with flow as the prevailing way to understand and represent water is a symptom of the abuse of naturalistic language, a presumption that renders our thinking obsolete (Cortesi, 2021b; Bateson, 1979). Seeing movement in water is the result of a lens of observation that privileges physical forces, that brings the observers to notice the kinetics of nature instead of, for example, its relational abilities. It is to see water as an engineer or a physicist would see it. It misses the ecology, the wonders that water can make and the perils it engenders, the muddy puddles and unforgettable gushes. Preferring one image to all possible others is, as I will discuss more below, more a

⁴ Science History Institute, Downstream, accessed at <https://www.sciencehistory.org/downstream> on July 1, 2021.

symptom than a disease. In the next section, we will discuss another and more prevalent lens, that of the chemist.

4. H₂O

In this fascinating, if obsessive, exercise of asking “what is water”, the most surprising finding, as announced at the onset, has been the high number of people who represented water as H₂O, but otherwise weren’t necessarily comfortable with chemical vocabulary. I was stunned by this uniformity yet discrepancy—why do people use jargon that is effectively foreign to them to talk about something as mundane and quotidian as water?

Direct experience, however, is not necessarily the main constituent of what we term knowledge. Negating that water is H₂O because we experience neither the molecule nor the elements would be like denying that the sun is a star because one does not see it twinkle in the night, or that the earth is a sphere because the human sensorium does not perceive its curvature. Perhaps H₂O is just a ready-made answer, a mnemonic remembrance from schooling—it can be uttered as an automatism, without requiring any actual thinking.

Taking seriously this automatism, however, can still lead to some reasoning. Let us take a step back. Water has an “unnoticed indexical component,” which means that its meaning is dependent on the context in which it is used (paradigmatic indexical are this, that, here, we). Building on Kripke (1971), Putnam explains, “water is stuff that bears a certain relation of similarity to the water around here” (Putnam, 1975: 152). To simplify, those who are used to accessing water by opening the tap, will (mostly) imagine water as it runs from the tap. In North Bihar, my interlocutors and I called a certain blob of matter with the name water; we pointed at it; yet, we still meant different things—where I saw water, for example, they saw waterland (Cortesi, 2021b).

Saying that water has an indexical component is equivalent to saying that the sign is dependent on the context (Barthes, 1964), thus it is related to more than one semiotic object in Peircian semiotic theory, which also means that the signifier is associated with more than one signified in traditional Saussurean linguistics. Saying that water (that which is relative to a context) is H₂O (that which is absolute) means, at least, that water has multiple meanings for the same group/person. The term “water” represents, and evokes, plenty of different waters, some of which are indexical, operational, practical, while others are not.

Jayesh, a retired judge, after replying to my question that water is H₂O and not remembering any other molecule, preempted my reply: “In my mind, I was thinking about potable water—maybe you meant something different?” “What would you have said, if I meant some other type of water; sea water perhaps, or rainwater?” I replied. He thought for a moment and shook his head: “I would have still said H₂O. We mean so many things with water, don’t we? And each of them means a lot. Water just means so much, but all of it is H₂O.”

Water does mean so much—but what does H₂O mean? H₂O as a definition for water seems unspecific, applicable to multiple waters. At the same time, as we will see, it is so specific that it is barely ever applicable in practical everyday situations. Just like flow, it is a stereotype, a generalization, an idealized type, neither indexical nor coherent with the operational, practical aspect of the experience of water, nor applicable to the same range of uses as “water.”

We have seen that, when asked for a definition of the unspecified term water, many respondents to my question ended up using a generic, non-practical, stereotypical, excessively specific denotation while recognizing the greater range and applicability of the word they had to define. This observation leads to two considerations. First and foremost, it questions the epistemic presupposition of the exercise of asking “what is water” and expecting a comprehensive answer; the fact that people say that water for them is H₂O does not mean that water for them is *only* H₂O.

Second, to the larger body of scholars to whom this special collection speaks, it bears value to leverage the indexicality of the word towards

noticing the many waters that are referred to by those with whom we (scholars of water) speak. Without assuming a theory of truth that links words to things, paying attention to the waters with whom people are connected in their environments, their myths, histories, bodies, and dreams, containers and contained, brings us close to understand the possible richness of water. In other words, water is relative not as much to a theory of truth but to a *theory of water*. It is a theory of water that ontologically holds what (people think) water to be. It is a local theory of truth that relates its ontology, not its metaphysics, to the context. In sum: the crucial epistemic opportunity opened by grappling with the indexical component of the term is in tension with the rigidity of the water universality represented by the H₂O answer.

But why H₂O? The origin of calling water H₂O rests on a division of labor operationalized at some point in history—Putnam dates the rise of chemistry to around the mid of the eighteenth century—that relegated the understanding of water to the realm of the expert. The fact that many people define water as H₂O means that in certain settings it is common to restrict the representation of water to the domain of scientists who ground their expertise on molecules and their interactions.

It is increasingly true, though, that recognizing water involves some knowledge of its potential uses. Putnam writes that “everyone to whom gold is important for any reason has to acquire the word ‘gold’; but they do not have to acquire the method of recognizing if something is or is not gold (...) This division of linguistic labor rests upon and presupposes the division of non-linguistic labor, of course” (1975: 145). While water that looks dirty could contain only aesthetic contamination, perfectly clear water may be toxic to drink. As we learn about new contaminants, many of them of a recent industrial genesis, we also realize that the human sensorium is increasingly unable to safely recognize water usability. Even if we can attribute the name *water* to a variety of matter, it currently takes specific—biochemical—expertise to investigate which water can be safely used for any specific purpose.

Is it disconcerting that the multiple meanings and values of water are relegated to be represented through a foreign language? Words are loaned all the time from one language to another, a process usually accompanied by some change in meaning. If we consider the system of indicating molecular composition as another language, then, just as the word *alibi* does not mean “elsewhere” as the original Latin, so *aich-too-ö* does not necessarily refer to the two atoms of hydrogen linked with one molecule of oxygen anymore.

H₂O literally does not make too much sense anyway. At times, as a follow up conversational topic to my “what is water” question, I have asked whether water is *really* H₂O. This question unequivocally engenders reactions of stupefaction—wait, are you saying that water may not be H₂O? Many find, like Putnam, that the fact that water is H₂O is “metaphysically necessary and epistemically contingent” (1975: 312). Even when he apparently went back on this position, a practice to which he was no stranger, he did not really contradict it. Water, Putnam conceded, may not be H₂O in the sense that stuff that resembles water may be called water but then turn out not to be H₂O (Putnam, 1990). In other words, someone may be wrong in calling water something that is not water. For Putnam, real water is nothing but H₂O. In fact, the proof of water being water lies, from beginning to end, in its reality as H₂O. Putnam’s reasoning hinges on an axiomatic externalist theory of truth that makes its elaboration redundant and inadequate to reach its own goal.

I maintain that water is *not* H₂O for a variety of reasons. First, because not even the chemist, the expert to whom we have relegated the labor of deciding what is water, thinks about water as simply H₂O. For almost half a century, the branch of chemistry that focuses on molecular physics has studied pure water as a “temperature-driven balance between the hydrogen bonded and nonhydrogen bonded forms” (Brewer et al., 2019: 212). For example, VandeWall explains that a glass of “water, pure as water can be” contains ions other than H and O. And even the H and O ions are not necessarily organized as H₂O, but also through other microstructures, such as OH[−] and H₃O⁺. At most, says

VandeWall, it can be said that the purest water contains H and O ions in a 2:1 ratio. Brewer *et al.*, proponent of the hydrogen bonding theory, still think that not even 20% of ocean water is made of H₂O, and write instead the formula of ocean water as (H₂O)₅ (2019). All molecules are nothing but theoretical models (van Brakel, 2000).

Following VandeWall's explanation, it becomes clear that amongst the most important properties of water, molecular structure is not as consequential to determine what water is nor how it behaves. "All the typical observable properties of water—its pH, its density, its boiling and freezing points, its utility as a solvent, are dependent not upon its atomic ratio but the interactions between the dissociated ions" (2007: 911). VandeWall argues against an essentialist position, the idea that water has an essence, i.e., that water composition implies metaphysical necessity, an intrinsic necessary state (Ellis 2001 in VandeWall, 2007). In plain language, there is no attached behavioral significance to the H₂O chemical formula. It is not because it is liquid that it will flow. It is not because it is colorless and tasteless that it will be clean water. It is not because it is water that it is H₂O (nor vice versa).

But, again, this discussion presupposes purity. The "pH, density, boiling and freezing points, and utility as a solvent," depend *also* on the presence of other matter than H and O. Does *pure water*, a substance that does not contain anything but hydrogen and oxygen ions even exist? Let us consider steam, which VandeWall does not discuss, but which we can consider the purest state in which we know water as only H and O. When steam condenses, we call it distilled water. Distilled water, however, still has some low electric conductivity, evidence that it still contains a small quantity of salts presumably mechanically carried up during the variation of temperature or pressure that causes water to evaporate. Ironically, this assumes that water is the purest, or is closer to H₂O, precisely by, or after, being a gas, therefore not a liquid, through the latter was the term that my respondents repeatedly identified with water.

What does the definition of water as H₂O do? We have seen how the metaphor of flow hinders possibilities of understanding increasingly common experiences of water such as stagnation, tidal surges, and floods. Calling it H₂O is a way to stick to a specific set of material qualities, while not actually making any reference to experiential matter. It is a way to talk about water as independent from people and their experiences—by so doing, it hides crucial qualities of water and sever its intricacies from its ecology. Ironically, the opposite is often the case, as many of the responses I gathered associated water with life *and* purity or H₂O. Technically however, pure water, or H₂O, is that which does not contain life—there is no life in hydrogen and oxygen per se. H₂O is a form of reductionism that prefers science, and a specific type of science, over the wonderful multiplicity of water and its sensorial experiences.

Water as H₂O is an ideal type that exists in people's automatized language and system of beliefs, dreams, conversations. We call it water, and with one name, we assume one molecule, one thing, one behavior. In the light of this discussion and its urgency, the opposite seems equally true and perhaps more relevant to understanding the complexities of water. Water's dissolved ions, as well as its properties as a solvent, seem to be crucially consequential. What if we start thinking about water as a solution, therefore a mixture, a carrier, a component, a matrix?

5. Solvent

H₂O, a simple perfect union between hydrogen and oxygen is a proclamation about purity—a concept whose images water draws to itself (Bachelard, 1983). It is unclear to me why purity is such a fetish that it turns up through the least pure and most *pollut-able* (i.e. prone to pollution) of substances. Considering water as the anti-purity substance, the mixture, the solvent and the solution, is a far more complex, and realistic, representation of water. Water may or may not flow, but it never stays alone.

In North Bihar, I unlearned water-as-purity and started thinking about water as a solution, as the solvent that is prone to mingle, enter, carry, absorb. The older generation of farmers in North Bihar, an area

with high river density, remember irrigating their fields with water from fluvial inundations. In my five years in North Bihar, elderly farmers taught me the beneficial effects of nutrient-rich water and mud—they taught me to think about water as waterland (Cortesi, 2021b). They could not teach this to their children: those, now running households, practice modern agriculture. High-yields crops require intensive irrigation, available only from the aquifer through motorized borewells. Groundwater appears colorless, tasteless, odorless (more nuance in Cortesi, 2018a), as well as expensive and nutrient-free. Farmers, therefore, supplement it with added industrial fertilizers and top it up with synthetic pesticides. It is not only that the current farmers do not want to listen to their elders' advice. In most places, they could not irrigate their crops with river water even if they wanted to, since a few decades ago the rivers were disconnected from the floodplain through the construction of embankments (D'Souza, 2006; Mishra, 1997, 1999). This separation, of which I write elsewhere (Cortesi, 2021b), has taken farmers on a dependency path of costly inputs and risky investments, and thus indebtedness, one of the main reasons for the high rate of rural suicides in the country (Jeromi, 2007, Kennedy and King, 2014, Merriott, 2016, Sandri, 2017).

Nothing discussed here is a blanket statement. First, what is dissolved in water is not necessarily desirable. There is no romanticization of either water or waterland. A mother who knows the effects of toxic drinking water on her breastmilk and on the baby she is carrying is distraught by drinking perfectly colorless, tasteless, odorless water that is still likely to contain DDT (e.g. Langston, 2010), or for that matter, cadmium, opioids, PFAS, lead, chromium, THMs, fluoride, atrazine, PCBs, arsenic, mercury. Her desire for purity is her environmental and human right as well as her responsibility towards her child. For society, such contamination is a failure and a crime.

Second, water as solvent may be sensorially understandable, or may not be. Krause explains the multi-factorial considerations of those for whom foreseeable floods bring tourism and income (this volume). Some of these waters are given distinctive names, others are not. Ley's interlocutors in Indonesia call *rob* the tidal flooding, a swelling of the river with polluted water and unpredictable outcomes such as rapid land subsidence (this volume). The farmers in North Bihar, instead, call water *pani* or *jal*, even when they mean waterland, thus using water words that carry no indication of the solutes that water contains.

Water-as-purity and water-as-solvent are not alternative visions. Solution and dilution have been infamously considered as the path, if not towards purity then at least towards legality. *Dilution as the solution to pollution*, or tolerating dirt in ample quantities of water, remains the mantra of many practices of cleaning, a predicament that stands on the infinite availability of water. While this is formally illegal in many countries, it is also the logic behind the idea of "permissible limit," thus behind the very idea of legality in water quality.

Water is used to dissolve, thus supposedly absolve, the sins of those who dirty it. Yet water's ability to deliquesce (in the sense of bring into solution) is relational and contextual. The solution is also in the hands of the solute, its solubility, its openness to be affected by water, and several other variables such as pH, temperature, the presence of other elements and turbulence. We see this in our boiling pot: when the temperature rises, common salt and sugar dissolve, while limescale deposits. And in our pipes: the chemistry—not the misgovernance, the politics, and the racism—of the lead poisoning in Flint, Michigan, can be simplified by saying that lower pH increased pipe corrosion and thus brought lead into the drinking water.

Some of my interlocutors in North Bihar, an area ridden with inequalities that are reinforced through environmental practices, use the *muddy semiotics of mud* (Cortesi, 2018b) to discriminate mud-less yet already victimized bodies. Some of the same farmers that taught me about waterland also believe in the touchless contamination of water by people identified as belonging to lower castes. Some of these farmers suffer from these beliefs by others. Others rebel against practices of casteism enforced through rules of water access, yet identify water with

cleaning and purity more than they conceptualize it through solutions and nutrients. Contamination, in North Bihar as in other parts of South Asia and the world, is an apt example of how the material and the symbolic realms are completely inextricable (Douglas, 1966; Cortesi, 2018b).

6. Conclusion

To conclude this introduction on the semiotic note reached in the previous section, I propose the metaphor of water-as-mirror, a reinterpretation of the image first offered by Bachelard (1983). Water-as-mirror invites those who stare at water to reflect back on themselves. Not only is the mirror compatible with stagnant water, the “other” of flow; it also refrains from suggesting any chemical or social purity, nor does it require the colorless, tasteless, odorless qualities referenced in my empirical exercise. In addition to rejecting some of the most common stereotypes, the mirror allows the observer the possibility of breaking it, producing a quasi-event of ripples, perhaps revealing the color and smell of this particular water. Or it leads the observer to pause, extending the observation, contemplating the all-encompassing static and silent present of mirror water.

Water-as-mirror suggests the possibility that the ways in which we talk about water are not as much interpretants of the semiotic object as of ourselves, the observers, as well as of the society from which such interpretations develop. One, holding water as the epitome of purity is indicative of the use of natural resources to validate some form of moral hierarchy and social inequality. Two, asserting flow as the main way to understand water reveals something about our limited sensorial abilities—we tend to perceive only what is within the *waveband* of our own tempo and sonority. Three, water as flow talks about our cognitive habit of stereotyping, a device useful to extract overall, generic characteristics at the cost of rendering invisible anything that does not fit in. Four, opposing water as a flowing liquid to land as solid reflects the dichotomic, binary chains of classification through which we often cognitively operate (Bowker and Star, 1999; Cortesi, 2014). Five, calling water H₂O betrays the partially justifiable way in which we resign our understanding of water to an uncommon form of scientific expertise. Six, water as H₂O also reasons with the broader-than-culture custom of borrowing words, emptying them of meaning and refilling them with new significance.

I have played around with a variety of “we’s” in these few pages. The reason for that is the realization that the world itself is contingent upon our *collective* understanding of it. Accepting the impossibility of a single we, a single collectivity, a single scale does not mean that, when talking about water in times of climate change, we can ignore the planetary scale. To this goal, my quasi-survey speaks about the fact that our understanding of water is in dire need of an update. Some of the *we’s* were explicitly directed to scholars. In those cases, I start with myself and I invite anyone who wants to join me—a position that, used to observing others, we rarely explore.

The way my interlocutors talked about water displayed the paradoxical contours of our capacity to be affected, to become. If we are, to a certain extent, porous, we could actually be sensitive to the affordances of the concept-word here proposed: waterland. From the floodplains and contaminated aquifers of North Bihar, an area of anticipated climate change, I propose the term “waterland” to break down not only the dichotomic classification of water and land, but also the stereotypes and moral imperatives used to represent, and perhaps understand, water. I believe “waterland” has the potential to inoculate us against the abuse of esoteric naturalistic language, and to turn our attention from the micro individual matter to macroscopic and relational qualities and quantities. Waterland has the advantage of demanding not only a finer tuning of our sensorium, but also a rethinking about the ways in which we attribute time, space, and life, or models and formulas and moral values to the matters of nature. For there is no way to confront the current situation unless we formulate ways to think and live with difficult waterlands.

At one level, it is about semantics, the association of words with things, signifier with signified—the study of how we word our world. At another level, it is about semiotics, the association of signs with things, semiotic objects and interpretants—the study of communication and meaning beyond language. As both semantic and semiotic relations shape our knowledge of the world, it is worrisome to find them replete with stereotypes. Such generalizations of water, often defined as dreams and desires, are in fact hydrotopias, some of which, like those about purity, are laced with moral and therefore political implications. I argue that in order to think with water in times of climate change, an excellent example of which is presented by the papers in this issue, takes the undoing of such hydrotopias. Then, it also takes some re-learning, an example of which is the concept of waterland: not jargonistic, but from people to people, from those who suffer from disastrous waters to those who are expecting them under climate change.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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