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**Towards a contemporary philosophical
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Abstract: The break of the twentieth century has seen two fundamental theories challenging the fields of mathematics and (heterodox) economics – (ZFC) Set theory and Veblen's Institutionalist economics. Although no direct relationship between these diverse projects has ever been documented, this paper argues that Veblen's appropriation of psychological traits and instincts, resulting in a comprehensive social theory of institutional frameworks, utilizes a mode of axiomatic thinking analogous to constructing sets in mathematics. Contemporary philosophy and psychology have only recently shown how their theoretical cores can relate to set theory, potentially retroactively uncovering how Veblen's mode of thinking the relation instincts-habits of thought-institutions could be philosophically interpreted anew. This mode of inquiry thus also exposes the overarching, albeit implicit, aim of this paper – to outline the preliminary steps towards a (continental) philosophically inspired critical theory of institutions relating to the critique of political economy.

Keywords: Thorstein Veblen, set theory, instincts, axioms, Ernst Zermelo, institutions

Introduction

The early twentieth century saw the development of two important theories that would eventually come to significantly shape their corresponding disciplines in the years that followed – namely, mathematics and (heterodox) economics. In the year 1899 a Norwegian-American economist and sociologist Thorstein Veblen published his first work with the title *The Theory of the Leisure Class*. This book, at first glance comprehended as a satirical portrayal of the developed capitalism, had also a much more succinct impact: it laid grounds and outlined a theoretical

dispositive for an institutional analysis of economic reality – an endeavour that unexpectedly unfolded into an entire new field of economic sociology. In less than a decade later, in 1908, a German logician and mathematician Ernst Zermelo revolutionarily proposed the first axiomatic system to formalize set theory (Zermelo [1908] 2010). Set theory had finally become a foundational theory for modern mathematics.

By now it has become a well observed fact that Veblen considered his work on anthropology of human instincts presented in *The Instinct of Workmanship* (1914) as his only important work and genuine contribution to economic theory – the book itself representing a culmination of his broad and diverse research into economics, psychology, anthropology, sociology, etc. (Dorfman [1934] 1972, p. 324) This aspect in his theorizing is being currently acknowledged with the renewed interest in his theory of instincts, as arising in e.g., Waller (2017), Hodgson (2006), Cordes (2005), Almeida (2015), Ishida (2021), challenging scholars to probe deeper into the psychological influences on Veblen's thinking. His main references include first and foremost physiologist Jacques Loeb on psychological and biological import of ideas to economic reasoning, whereas he also cites other influential initiators of psychological science from the late 19th century – e.g., William McDougall, C. Lloyd Morgan, William James and later also a colleague at Missouri, Maurice Parmelee.

Psychology of Veblen's time was a matter of empirical observation, experimentation and research, a psychological science roughly originating from G. T. Fechner's experimentation on judgments and sensory experiences, leading to the field of psychophysics (a bridging of natural and human/social sciences), W. Wundt's orientation towards experimental psychology (William James) [1], later making different turns to variations such as associationist psychology, evolutionary psychology, psychoanalysis, mathematical psychology, behaviourism, and so on. Building on these foundations the last few decades have brought new progress in theoretical psychology, i.e., in the relationship between mathematics (set theory) and psychology. Danish psychologist Jens Mammen (1983, 2017) has proposed an entirely novel logical approach to psychology by basing two most fundamental human faculties, sense and choice categories of human subject in a set theoretical universe – devising a topology of subject/object relations, a relational interface between human subjects and world of objects –

whereby axioms come to establish and distinguish our re-representation of cognitive inferences in conducting human perception and action. Similarly, Veblen's other methodological core discipline, biology, has seen its first attempts of axiomatization already performed by J. H. Woodger (1937) and is currently also undergoing (retroactive) mathematical 'naturalization' (see, e.g., van den Berg and Demarest 2020, Eşanu 2013; Rodin 2014, p. 88).

The impact of initial axiomatic formalization in set theory (with its most widely accepted variant the Zermelo-Fraenkel set theory, so-called ZFC set theory, C standing for an additional Axiom of Choice) on other disciplines has been profound throughout the twentieth century. In this introduction we will limit ourselves to those breaking advancements achieved in humanities and social sciences relevant for our present inquiry. Let us consider philosophy. We encounter two grand names in contemporary philosophy, namely David K. Lewis and Alain Badiou. Both of their most influential projects, the former with *On Plurality of Worlds* (1986) and the latter with *Being and Event* (1988), ground their metaphysical projects on set theory, either to posit 'mathematics is megethology', a mereology in the plural (Lewis 1991, 1993) or simply stating 'mathematics is ontology' (Badiou 2005a). However, what they both implicitly invoke with their usage of set theory is the reliance on axiomatic formalization as *a mode of thought*. Set theory 'naturalized' in philosophy becomes an intuition-thought-faculty of presenting objects prior to their linguistic naming or any other kind of representation. That is, it invokes *rules of inference* for all intelligible thought, be it ideational or constructive. An astonishing example of how such an application could be made in social sciences was already proposed in the case of sociology; Niklas Luhmann gives an unsurpassed delineation of his *social systems* (Luhmann 1995) – a systems *theory* and functional *methodology* (Luhmann 1995, p. 55) – constructed in terms of formal rules governing set theoretic universe. One other example of such application, this time in philosophy of science, would be Wolfgang Balzer's implementation of a *structuralist theory of science* (see Balzer and Brendel 2019).

The aim of this paper is not to go into an overview of the impact set theory had on the course of different disciplines. We rather wish to contribute to broadening the contextualization of Veblen's position in the history of economic thought and present his theorizing as unexpectedly pertinent to modern metaphysical, i.e., continental philosophy, approaches to (social) ontology and unify this reasoning

for our outlining of a novel *critical theory of (economic) institutions*. We will argue that his gesture immanently already entailed an *axiomatic mode of thought* that pervaded his positing of habits of thought, institutions and institutional frameworks.

How does this mode of inquiry fit in Veblen's definition of the notion 'institution'? Let us, for preliminary purposes, slightly supplement one of his definitions of the notion, one given in *The Theory of the Leisure Class*:

The institutions are, in substance, prevalent habits of thought (*ideas*) with respect to particular relations (*belonging*) and particular functions (*comprehension*) of the individual and of the community (*both presentations of a determinate situation*); and the scheme of life, which is made up of the aggregate of institutions (*representation*) in force at a given time or at a given point in the development of any society, may, on the psychological side, be broadly characterised as a prevalent spiritual attitude (*instincts*) or a prevalent theory of life. (supplemented in parentheses and italics, Veblen [1899] 1994, p. 118)

In light of the above premises, we propose to verify the following hypothesis:

Does Veblen's appropriation of (psychological) instincts follow a mode of thinking – that is, in forming habits of thought and institutions – in homological manner axioms play in mathematics/set theory to construct and de/limit the domain of objects?

The above hypothesis therefore asks whether Veblen's usage of instinct theory invokes the 'formal' rules for the construction of his economic sociology of an institutional framework in parallel to axioms of ZFC and first order logic that confer to mathematics its entire universe of objects. The question immediately arises: can the two approaches be put in any kind of correspondence?

In what follows in the next section, we introduce a selection of instincts Veblen chooses to adopt and adapt from McDougall's book *An Introduction to Social Psychology* (1908) and integrates in his theory of instincts – 1. The Instinct of Workmanship, 2. Emulatory Instinct, 3. Instinct of (Race, Group) Solidarity, 4. Instinct of Self-assertion, 5. Parental Bent, 6. Predatory Instinct, 7. Idle Curiosity and we add the 8. Modus Ponens of Technological (Determinism) Materialism, which is not an instinct for Veblen, but hovers ubiquitously over entire human action in his writings. All of the accounted above are put in an

interpretative correspondence with the ZF axioms [2] – 1. Axiom of the Empty Set, 2. Axiom of Extensionality, 3. Axiom of Pairing, 4. Axiom of Union, 5. Axiom of Power-Set, 6. Axiom (schema) of Separation, 7. Axiom of Replacement (or Substitution), 8. Axiom of Foundation. [3]

In the concluding section, we acknowledge Veblen's historical-anthropological methodology, entwined with materialist philosophy, in underlying his social theory. Furthermore, we highlight his account of understanding the constitution of habits of thought, and consequently of institutions, as emerging from rational and teleological workings of different human instincts, underscoring the significance of the instinct of workmanship. Furthermore, according to recent elaborations and theorizing, we argue that, although perhaps an anathema in general economic heterodoxy, Veblen's mode of reasoning is reminiscent of how mathematics 'thinks' its objects from twentieth century onwards.

Veblen's instincts and ZFC axioms

In what follows we maintain that both mathematical axioms and human instincts serve as self-sustained principles of thinking and conveying their respective objects – statements and syntax versus doing and organizing of the individual and the social. The axiomatic method is an act of organizing elements of a formal language, a symbolic structure, an entire science, or a social theory in a set via the relation of *belonging*. Furthermore, axiomatic thinking is an axiomatic prescription in the form of the multiple that introduces an ontological scheme of presentation (of sets). What this type of [axiomatic] thinking implies is the *absence of the One* (the God, the Absolute, the Substance, etc.) or, put differently, that we do not operate with any kind of determinate foundation. Therefore, what we have at play here are only sets, undefined terms, whose connections are prescribed, but never named. On the other hand, [mathematical] axioms are generalities that break down the One to Two and towards thinking multiplicity in its interiority (i.e. without empirical exteriority). There exists no exterior point of beginning, i.e. some ulterior cause or conceptualization, rather the axioms are propositions that prescribe connections in a given presentation of multiplicities/sets without any reference to an object – axiomatic thinking is object-less. In sum, the axioms as generalities unleash the deductive capacity

(via a decision) to render particular situations and institutions thinkable or presentable in a determinate institutional framework (e.g., a regional ontology) – initiating from the multiple-of-nothing point, i.e., the void.

How can we interpret Veblen's theory of instincts in an axiomatic fashion? This is the objective of the following subsections. We treat each of the ZFC axioms to be output-wise equivalent to an instinct/inclination of human doing.

Instinct of workmanship \Leftrightarrow *Axiom of the Empty Set*

We start off with the Axiom of the Empty Set. Although the axioms of Zermelo-Fraenkel set theory usually begin with the Axiom of Extensionality, which we discuss immediately after, it is because of its equivalence with the *Instinct of Workmanship* that makes it the most fundamental axiom concerned for the present inquiry. First, a formal definition of the empty set: *There exists a set with no members*. Formally defined with symbolic language: $(\exists x) [\sim(\exists y) (y \in x)]$, or conversely $(\exists x) (\forall y) (y \notin x)$. Observing closely, we deploy the concepts of existence, set, nullity and membership: all operators thought together in a single stroke and unified manner. The comparison of fusions and collections is perhaps helpful here: fusions are only parts of a whole, they always take existence (\exists) for granted, consequently no definition of set or belonging relation \in – they are assembled according to a contingent rule and there can be a manifold of valid combinations. On the other hand, collections do not just aggregate parts into one, but instead use 'containers' or simply 'sacks' or 'clubs' that are usually established on memberships and might just as well have no members. In the latter case we speak of an *empty set* and designate to it the common mark \emptyset . Having laid down the formal definition we are now in a position to further introduce the philosophical stakes of the empty set. We follow Badiou here who names it, with a long recourse to various philosophical handlings of the notion harkening back to pre-Socratic philosopher and founder of ontology, Parmenides, *the Void*. Void is the proper name of an empty set, in mathematics indicated by empty curly brackets $\{ \}$ and marked by the symbol \emptyset . The proposition is the following: 'In set-theory, the void, the empty set, is the primitive name of being' (Badiou 2005b, p. 57). On the other hand, the empty set designates *the* multiple (being) from which all the others result in a sequential application of the

succeeding axioms, the example of which would be: ideas (Plato's *eidos*), or in Veblen's social case, habits of thought. As mentioned above we have already presupposed in the formal definition a mode of existence. But an existence of what? Indeed, the empty set is an indifferent multiple as any other – a multiple of nothing. It is presented in a situation as un-presented and its only mission in the presented situation is to count. However, being empty means it is (de)void of any content, it is an unrepresentable-existent – what is presented is only the presentation itself, a proper name of being – the void. Only that this multiple, the void, is unlike any other, for it embodies the indifference to any other on the sole predicate: it is the existence of nothing. *Omnipresent*, and always subtracted from *de facto* presentation, i.e. from being counted into the situation or set, it sutures being to every presented multiplicity. So, the existence of a set with no elements is a negation of the relation of belonging, retroactively positing then also the negation of existence, i.e. of anything differentiable presentable, or rather, a subtraction of being from the presentable. What is left is a 'sutured' trace of being's proper name to the empty set – the void, \emptyset .

Now as to our re-interpretation of Veblen's [4] 'institution', we posit it as follows:

Different collections of multiplicities (e.g. actions, rituals etc.) can also count as one – they are made into consistent habits of thought.

It is precisely this *can* that is the operation based on the appending of the void, for it is an operation of unity of indifferent multiplicities with the void, enabling them to consist in a situation, that is, to be counted-as-one after they are presented in a situation. This is why the void is also the initial 'presented' multiplicity, without any imputed difference or concept, it has to be of nothing in order to initiate the in-different operation of forming-into-one.

Just like the young scholar Marx deployed and tenaciously held on to the concept of human species-being (*Gattungswesen*) that realizes its own estrangement, the objectification of his labour in order to sustain his subsistence and activity as human (Marx [1844] 1988, p. 75), so did Veblen think of the instinct of workmanship as one of the most significant of human inclinations. In a materialist understanding of nineteenth century both thinkers maintained the universality of labour as a generic determination of human species. We will therefore propose to interpret a unifying moment of defining workmanship as a generic activity of inconsistent human-species, sublating them and resulting in

a mediated form of consistent 'agents seeking to accomplish some concrete, objective, impersonal end' (Veblen 1898 in Camic and Hodgson 2011, p. 159); *mutatis mutandis* with labour as a generic name of man's essence, or void as his proper name of being. The instinct of workmanship pertains to each and every human being, this also precisely being the reason why it is always subtracted from immediate presentation. We never talk about a workmanship or labor 'in general', rather we speak of some determinate laborious endeavour or some particular human activity with a means to an end. However, observed from the other end, what makes or counts as presented those tasks man eventually accomplishes, is the workmanship instinct, whereby it itself always remains in the background, foreclosed as universal (see also Almeida 2015, pp. 231–232). It is a hidden remainder, prohibiting the existence of a Whole, i.e. a closed-in totality, rather opening up a gap in it, making it non-All as an unfolding infinite sequence of progressing change. Workmanship as a void is sutured on every elemental presentation of human agency; it verifies the deciding step from an inconsistent human intelligible pre-thought to a consistency of a habit of thought.

There would be no institutions if it were not for the habits of thought. But habits of thought have, on the other hand, a specific set of rules of inference and as with every set of rules, there has to be an initial proposition, a zero-ith axiom, the most elementary coextensive one to all other axioms. Set theory made this of the Axiom of Empty Set, just as Veblen made grounds for his social theory (of instincts) by starting with the Instinct of Workmanship. The empty set qua void is by definition a content-less entity, it is without a referential concept, for if it had any determinate content it would immediately count-as-one and consequently be differentiated in a structure – it would be made primordially consistent and we would end up in an impasse, as we find them in languages or formal systems. The Instinct of Workmanship is alike; taken in its pure abstract notion it has no consistency – there is no human action without a concrete aim, an objective end; empirically we know not of any *abstract* human action – therefore it will be an always-already vanishing term for every institution. It goes as a corollary to the fact that the Instinct of Workmanship is *universally* present, that it negates any determinate differentiation as opposed to all other presented terms.

Emulatory instinct \Leftrightarrow *Axiom of Extensionality*

Axiom of Extensionality poses a very simple intuitive proposition that the two sets (A and B) are equal (identical; $=$) if they possess the same multiples that constitute the multiples A and B. Or we can simply just say A and B are the same, if they are composed of the same elements. However, the second definition comes with a caution since it obliges us to be strict in the definition of the term *element* – it denotes nothing intrinsic to the concept of element. We can be easily seduced that two elements, e.g., $\{a\}$ and $\{a, b\}$ are equal in a determinate situation U, but if we posit a relation such as $a \neq b$, we can observe it to immediately violate the axiom [5]. So, we would have that, if every multiple presented in the presentation of A is also presented in B and vice versa, then A and B are the same.

From the point of view of economics, Veblen maintains that the *propensity for emulation* is 'probably the strongest and most alert and persistent of the economic motives proper' (Veblen [1899] 1922, p. 110). On the other hand, it comes to be one of the most archaic of instincts, with pervading traits emerging in the early stages of human history, from the savage era of humankind onwards, although it gains its most significant form in the times of pecuniary emulation (see McDougall [1908] 2001, pp. 202–203). In essence, it is a mode of classifying oneself according to an identity relation – *a collection (set) is determined strictly by the elements that belong to it*. In emulation it relates the *other as the same* by means of (invidious) comparison. Veblen bluntly portrays its practical manifestation in the contribution to *Some Neglected Points in the Theory of Socialism*, (Veblen 1919a, pp. 392–402) where he succinctly depicts how a modern economic man is engulfed by this instinct in an existing industrial system based on private property [6]. The outcome of this archaic instinctive working of emulation, unravelling in the transitional phase from the savage to barbarian era, Veblen describes as that of predatory bent. It comes to pass realized in the form of e.g. marriage based on coercion and or, on the other hand, in the budding custom of *ownership*. Passing on to the modern era, emulation can now be observed primarily in the confines of *economic emulation*, a convergence of identities on the tenets of perfect competition, industrial and business activity, private property, accumulation of goods and wasteful expenditure, actions in the realm of finitude of human animal – neatly named

by the contemporary discourse as the *standard of living*. Putting this in set theoretic terms we obtain 'Western way of life' = {{perfect competition}, {industrial and business activity}, {private property}, {accumulation of goods}, {wasteful expenditure} (...)}. These principles now pervade as an everlasting export of the 'Western way of life' in its intensive re-territorialization of capital in the forms of foreign investment and globalization, consequently plaguing the factors of production with a ubiquitous western-type *standardized* scheme of life. Standardization of sameness by the other is the contemporary practical name and practice of emulation, best seen in the intrusive practices of operations management in the industrial process further expanded by colonial excursions. Finally, in its most generalized form, emulation of the modern era rests on the enjoyment derived from the universal consummation of private property. We might just add one corollary to the last remark: Are we not, on this point, adhering to Marx's postulate, that the identity of labour and private property dissolves into a negated identity of an alienated quality inherent in labour (surplus labour posited...) towards the capitalist (...as surplus value)? It summons up the following conclusion: It represents a determinate (identity) property relation that posits the ground for the law of appropriation (see Marx [1857/58] 1993, p. 470).

Emulatory Instinct, the way Veblen proposes it, presents an identity mechanism, one unfolding a drive for unending comparison, i.e. *defining the difference operation between the same and other*. Is it not in fact the present-day world that is infested with myriad different identities, ranging from national, religious, familial, linguistic, ethnical, social-media or economic variants, where the interplay of 'narcissism of small differences' presents the driving force of our future events? This point was highlighted also by Pierre Bourdieu's (1996, p. 479) take on social identities, i.e., embodied identities traversing the habitual social class strata that draw the maximal effects from those closest or minimal distinctions-differences in the social body. Localized small differences of ethnic or religious identities lead to wars and devastating calamities, frictions inherent in proximate national identities lead to rising fascist practices and authoritarian figures, and for the most universal of all, economic identities, these overturn everything, including us human subjects, into object-merchandise of the market. Just recall here Veblen's demonstration of economic emulation on the example of apparel: it occurs far more than rarely that people choose ill-clad for the sake

of being well dressed, extensively beyond the pure need of protective clothing to the body. The scope of economic emulation has gained great sophistication since then. Let us give an up-to-date example. All these new circumstances find support on our becoming virtual identities, a parametrically standardized identity based on algorithmic data aggregation of search engines such as Google or social-media platforms such as Facebook or Instagram. Conversely put, it shows how Marx's *commodity fetishism* not only forecasts a mediated relation of reified objectivity but is now gradually even becoming an *ex-post* immediately appearing social fact. The algorithmic (re)composition of our identities entails a presupposition that every object is *element-identical*, or rather, should have a converging tendency towards it. How this human reasoning is encoded in algorithms and reflected back onto our actions can be most vividly seen in the use of contemporary mass technology. The case how 'influencing subjects' promulgate the repetition of the same by promoting identification, or rather replication, to their faithful followers (who will, however, always remain *some other*), uncovers the persistent emulatory-elemental confluence on various sets of identities, simultaneously processed.

We will say then that the Axiom of Extensionality is entirely indifferent to any inclination of content-matter. We have only identity of multiples (and multiples of multiples) and a non-logical and an indifference relation, that of belonging (\in). On its account it does not impose any existential capacity, it merely introduces the differentiation principle for promoting identity and difference, or conversely the sameness and otherness of multiples, creating a horizon for instincts to operate in.

Instinct of (race, group) solidarity \Leftrightarrow Axiom of Pairing

Instinct of self-assertion \Leftrightarrow Axiom of Union

We chose to introduce two axioms corresponding to two instincts combined for the sake of convenience in our reading of Veblen's instincts and the argumentation that follows. We begin with the Axiom of Pairing, an axiom that intuitively seems and indeed also is a very simple axiom but brings forth operations immensely consequential for constructing the universe of sets. Formally it denotes one of the most basic axiomatic operations of set

construction. It states that if we have a pair of sets A and B, there always exists a set C, such that contains exactly A and B. By executing this operation, we simply 'construct' a new set, but what is more important, we can combine elements of sets into ordered pairs, meaning we can expand and structure (well-order) our universe, i.e. $(x, y) = \{\{x\}, \{x, y\}\}$. From this axiom we can also define the singleton, if $A = B$ we get $\{A\} = \{A, A\}$; for it follows directly from the Axiom of Extensionality that sets that have the same elements are equal. Although we can create an infinite series of single element or paired element of sets, to create a larger universe of sets we need one or more additional axioms.

First such axiom can be the Axiom of Union. If the Axiom of Pairing can be understood as the simplest of all for composing more complicated sets from simpler one, so can the Axiom of Union be understood as counting the decompositions, i.e. dismantling the set structure to its more basic components. So, a union is an aggregation of all elements either of set x or set y, noted as $x \cup y$. Formally, it is most simply introduced in the following manner: Given a set S, there is a set U_S so that $t \in U_S$ if and only if $t \in A$ for some $A \subset S$. To give an example: suppose $S = \{\{1, 2\}, 4\}, \{1, 2\}, \{2, 3\}\}$, then $U_S = \{1, 2\}, 1, 2, 3, 4\}$ and $U_{U_S} = \{1, 2, 3, 4\}$. As the example shows the operation of union is a dissecting operation, flattening out the structure and presenting members of the set.

Group solidarity is important for the survival of the species in the case of humankind, says Veblen. Only afterwards did it evolve into a racial solidarity that has caused and still does great mayhem and chaos to its kind. However, in its embryotic form it is a relation as well as a condition between individuals and their respective groups or communities. Veblen ([1899] 1922, pp. 219–221) makes it quite clear when he talks about individuals belonging to groups from the very outset, to which we will ascribe a primordial pairing. Take, for instance 'Prehistoric Human Universe' = $\{\{\text{individual}\}, \{\text{group}\}\}$, it obviously indicates a close relation between the two elements, a universe of mutual solidarity between the two. But according to Veblen we have one more and a different kind of primordial pairing immanent to solidarity instinct – the transmission of technological knowledge in cultural progress. He scrutinizes the state of industrial arts as a common stock of knowledge, a fact of group life and not any kind of individual endeavour, progressing transhistorically through generations of group expertise of communities. He goes on to remark: 'Such group solidarity

is a necessity of the case, both for the acquirement and use of this immaterial equipment that is spoken of as the state of the industrial arts and for its custody and transmission from generation to generation.' (Veblen 1914, p. 104) To put it succinctly, it is the very *modus operandi* for the extension of the preconceptions orienting the habits of thought, by ways of mutual support and reinforcement, how man creates traditions. And so is also the case with economics; if economics is to be perceived as 'the furtherance of the collective life process', then its object (the workmanship-inclined group practices) is to be investigated according to these underlying conditions. It has to be underlined that Veblen treats this instinct with a sense of archaic nature, predating self-interested, predatory or pecuniary behaviours of individuals to a peaceful and complacent era. To both, group of individual solidarity, stands exactly opposite the Instinct of Self-assertion, a drive that unmasks and reasserts certain more archaic or primal traits, i.e. elements. To these can be accounted contest activities, strong hand and forceful inclinations, respectful amount of prowess, or in Veblen's words: 'The plain man will ordinarily fight only when excessive momentary irritation or alcoholic exaltation act to inhibit the more complex habits of response to the stimuli that make for provocation. He is then thrown back upon the simpler, less differentiated forms of the instinct of self-assertion; that is to say, he reverts temporarily and without reflection to an archaic habit of mind.' (Veblen [1899] 1922, p. 249) Is it not precisely the operation of union that 'reverts' multiplicities to their more 'elementary' setting? As shown above, it is indeed the case that we decouple all the count-as-one multiples to their respective elements (which now also count-as-one) for us to create new compositions and situations.

We can demonstrate our argumentation on the assessment of Veblen's insistence on the crucial role played by technological knowledge in shaping the cultural landscape via instincts. His entire work elaborated in *The Instinct of Workmanship* reflects on the dissection of different planes of human evolution (peaceful savage, war-like and pecuniary barbarian, quasi-peaceful of handicraft era and the modern machine era) and builds the progression of the 'state of the industrial arts' resting upon (technological) knowledge in pair with cultural progression. Two more particular cases recurrently surface in Veblen's: (1) the *Dogma of Natural Liberty* manifested in the form of the *Natural Law* and linked together with *business principles* forms a new 'Economic Interpretation of History'. They are treated as cornerstones of a historical break occurring in the

progression from the handicraft era to the modern machine era. These newly established communities with 'a settled habit of rating the means of livelihood and the amenities of life in pecuniary terms' (Veblen 1904, p. 268) and relying on natural rights have been incorporated onto a new scheme of life and entail recomposed habits of thought. The second (2) encroaches on the first example in a historically more peculiar fashion of preconceptions – it also demonstrates how the axioms of pairing and union can be applied: say we have a general situation, denoting the Physiocracy period of the 18th century and transition to the 19th century i.e., 'Adam Smith's classical period' = {{{natural laws}, {natural rights}}, {{natural causal events}, {teleological determinism of nature}, {God}}, {propensity to efficiently reap natural causes}, {supreme human welfare}, heightening the effectiveness of natural processes out of which human nutritional sustenance emerges}. The latter element, also the only 'visible and discerned one' from situation's point of view, is presenting the *universal* objective of a given community. On the other hand, *pari passu*, we have a particular (classical) economic situation of that period, denoted 'Economic situation of 18-19th century' = {{{matter-of-fact causal sequences and correlations}, {animistic teleological sequences and correlations}}, {distribution, circulation, consumption,}, production, wealth}. Both situations and are paired together to form a new set, a situation 'Orientation of Political Economy of 18-19th century', we call it O, with all the counted elements = {...} {heightening the effectiveness of natural processes out of which human nutritional sustenance emerges}, {...}, wealth} giving us the general situation from a politically-economic point of view. The elements are obliterated by their universal containers, that 'suture' the entire situation and render it palpable. How do the habits of thought then become altered at all? It is when the Instinct of Self-assertion triggers, i.e. when we unionize all the elements to the forefront, in the working of the cultural progression. This can be most clearly seen how the 19th century brings forth a contradiction between production and distribution (i.e., for Veblen a hedonistic valuation) and its resolution in favour of the latter – the victory of utilitarian and subjective theory of value and defeat of the labour theory of value. In our formal demonstration this can be done with the presentation of new, 'immanent' and presented elements to the structure: $U_0 = \{\{\dots\}, \text{propensity to efficiently reap natural causes, supreme human welfare, heightening the effectiveness of natural processes out of which human nutritional sustenance emerges, } \{\dots\},$

distribution, circulation, consumption, production, wealth}. We can see here we are no longer dealing just with production as a universal notion embodying distribution, circulation, consumption, but now rather have every single notion outstanding. These unleashed notions are taken up by a new body of theory – hedonistic and pecuniary theory – postulating economic concepts, prevalent all the way down to today's (macro)economic model-building of economic behaviour assumed in the forms of utility-maximizing functions and conditions of households and firms, national resources etc.

We have introduced two of the most rudimentary axioms capable of constructing new sets; the Axiom of Pairing enables conjoining two sets into a (element-ordered) third set making the set universe denser, while the Axiom of Union operates to disentangle multiples to their more elementary compositions. We relate to them the two most archaic instincts, that of (race, group) solidarity and self-assertion, showing how habits of thought come to be formed and promulgated from their most elementary development onwards.

Parental bent \Leftrightarrow Axiom of Power-Set (The Set of Subsets)

The axiom of the Power Set posits that given a set A we have a subset B, where every member of B is also a member of A. Before proceeding we have to distinguish a new relation; now, in addition to the relation of belonging and of equality (Axiom of Extensionality), we can induce from belonging the relation of *set inclusion* (\subset). What is the distinction? It comes to be that we can form subsets from the members of the initial set, so they can count-as-on or are included in another set or are part of another set – all the latter pertaining to the same relation. We can also say that given a presented multiple there also exists another multiple whose terms or parts (=elements) are the sub-multiples of the first. Essentially, what the axiom does is that it 're-counts' all of the presented members of a set, it reiterates all of their combinations. Hence the 'power' set provides information about how rich or powerful a set is according to its terms – *cardinality*. But a few precautions arise here. We have to bear in mind that we can have a set A that is a subset of B without being an element of B. Consider the example: $\{\emptyset\}$ is a subset of $\{\emptyset, 1\}$ but it's not an element of $\{\emptyset, 1\}$. It is, on the other hand, an element of a different set, e.g. $\{\{\emptyset\}, 1\}$. But here $\{\emptyset\}$ is not a subset

of $\{\{\emptyset\}, 1\}$, because $\{\emptyset\}$ has an element \emptyset that is not presented as one of the two elements $\{\emptyset\}$ and 1 of the set $\{\{\emptyset\}, 1\}$. This just highlights the fact that the belonging and inclusion are not a relation of *inverse equivalent* but that of *implication*. There is one more thing in the adjacent example, the mark \emptyset , the name of the void. We can now posit also the power set for our first example $B = \{\emptyset, 1\}$; $P(B) = \{\emptyset, \{\emptyset\}, \{1\}, \{\emptyset, 1\}\}$. There was another reason for our choosing of this particular set $B = \{\emptyset, 1\}$; we can see from the power set $P(B)$ that it is composed of the void, the name of the void $\{\emptyset\}$, $\{1\}$ and the whole set $\{\emptyset, 1\}$. What can be immediately observed here is that the sets B and $P(B)$ are distinct, but also entail different 'power-size'.

The distinction is usually expressed with differentiating between collections and fusions. While fusions are a 'mere' sum of parts summoned together i.e. included in some whole, a collection retains determinate distinctions, or simply, names (or singletons) – to the former we attribute inclusion to the latter membership relation. What we eventually get is an act of (a separate) double count; we have some initial set that presents its multiplicities as multiple-elements (first count), but we also have a set of its subsets, i.e. a power set whose parts are exactly the multiple-elements of the former set counted as sub-multiples of another set (second count). The two sets are absolutely distinct, although the power set may contain the initial set as an upper and \emptyset as the lower limit. If we now take our set B , we can simply see that it has a cardinality of $|B| = 2$, but its power is 4 (or for countable sets 2^n). From this gap we gain what in contemporary philosophy Badiou calls '*the theorem of the point of excess*' (Badiou 2005a, p. 84), which stipulates that according to the power axiom the number of all included elements in a set is always greater than the number belonging to the set. This is also a corollary of the differentiation between collections and fusions. We will follow Badiou here on his regime of presentation (first count, structure, initial set) and representation (second count, meta-structure, power set) of an arbitrary situation. The power set thus includes all possible representations, properties and names (singletons) of a particular situation and counts them as one(s) onto its own structure. If it were that all possible subsets are represented, we would get a maximally complete representation with all the names and properties. Why do the initial set and the power set not coincide? Precisely because of the point of excess that states, apropos Russell's paradox of being an element of itself i.e. $\alpha \in \alpha$ and its negation $\sim(\alpha \in \alpha)$, that we have at least one element (subset) in the power set that does not belong to

the initial set. A representation that is not presented – just think of our example set and the void (\emptyset), it never belongs to another multiple nor nothing belongs to it. But this can be only seen from a 'larger' universe, namely the situation's power set to observe this fact. Later we shall introduce the Axiom of Foundation and show how these kinds of elements are foundational for the very existence of the universe of sets – the cumulative hierarchy.

We will maintain, according to the Axiom of Power Set, the irremediable excess of included parts (subsets) over belonging elements for any set. Put differently, there will always be more possible representations from any particular presentation of multiples – there are always some multiples represented and others not. We can say that it delivers the first step in constructing possible compositions and continuance of habits of thought. How 'strong' or 'powerful' any such presentation therein depends on the density of the latter, but also on how enduring a fidelity it can achieve.

It is against this background that one should reproach Veblen's instinct of Parental Bent. As one of his fundamental instincts it plays a key role in perpetuating human habits of thought through the continuum. Surely, in the first instance it is the transmission of inherited traditions to the next of keen, but Veblen makes it clear that he thinks of humanity at large. It would not even make much difference for the underlying principle would be exactly the same, just more fragmented and dispersed. In the essence it is a regime of representation of those habits of thought that are to be of ranked and highest esteem, those ought to be carried to future generations for their maximum benefit. On the other hand, the development of these traits lies in the ability to induce and represent, in the first instance all of the available existing representations (not all will ever become phenomena), and in the second, as selectively and competitively possible propose different variations of human action for the purposes of enhanced wellbeing. It is the parental bent holding the autonomous agency over representational regime of habits of thought. At least according to Veblen:

It seems to be these two predispositions in conjunction that have exercised the largest and most consistent control over that growth of custom and conventional principles that has standardized the life of mankind in society and so given rise to a system of institutions. This control bears selectively on the whole range of institutions created by habitual response to the call of the other instincts and has

the effect of a 'common-sense' surveillance, which prevents the scheme of life from running into an insufferable tangle of grotesque extravagances. (Veblen 1914, p. 48)

The shift in re-presentation can be simplistically illustrated with one of Veblen's examples: take those plants and animals in the man's horizon for the purposes of self-preservation. He chooses particular species for domestication and attributes to them anthropomorphic qualities. With the advancement of technology and accumulation of certain breeds and sorts he reconfigures (re-presents, names) them into cattle-breeding (animals) and tillage (crops). It could without a doubt end in a different manner or abolish their utilization altogether. We will later show, in line with the Axiom of Separation, the consequences of fixating a predication, to which also Veblen alludes when he talks about the modifications to the Parental Bent instinct when exposed to predatory and coercive proclivities. For our present argument it suffices to say that the parental bent draws its 'power' from its perpetuating reassertion grounded on the recurrence of particular conduct that manifests itself as the 'settled habitual verities of life'. In other words, the Parental Bent is a reiteration of all concurrent wisdom outstanding in cultural scheme of life, putting on the plane all up-to-date acquired knowledge of sedimentary prehistorical events for the next generations to decide upon new reconfigurations and representations – and conforming to a clear continuity and fidelity to the gerontocratic aspirations – thus contributing to the cumulative growth. Veblen puts it as follows: 'This body of habitual principles and preconceptions is at the same time the medium through which experience receives those elements of information and insight on which workmanship is able to draw in contriving ways and means and turning them to account for the uses of life.' (Veblen 1914, p. 51) Indeed, those habits (situations) that endure the most challenges of time progression will also be the most powerfully represented and anchored in the cumulative scheme of habitual growth. Even more succinctly put, Parental Bent is the wisdom of overseeing and tabulating all possible combinations, electing the most suitable options for general ends for community and future to come.

There are two chief examples of parental bent in (Western) human history, both belonging to the classical antiquity era of the Greco-Roman World: ancient Greek culture and Christianity. Let us just consider the philosophical strands emerging from the {classical age philosophy}. Under this head we shall find *presented*

different nominations e.g. 'Classical age philosophy' = {Pre-Socratics, Socratics, Post-Socratics} or more a detailed disambiguation, but far from exhaustive ≈ {The Milesian/Ionian school, the Pythagoreans, Heraclitus, The Eleatics, the Classic Greek Philosophy, The Stoics, The Epicureans, The Sceptics, The (Neo)Platonists, (...)}. Now, what matters is the continuum of the ideas culturally *represented* and refined in later periods. In these periods we encounter different combinations of representations of {{The Milesian/Ionian school}, {the Pythagoreans}, {the Heracliteans}, {The Eleatics}, {the Classic Greek Philosophy}, {The Stoics}, {The Epicureans}, {The Sceptics}, {The (Neo)Platonists}, {...}, (...)}. Once named, each of these represented terms is significantly replicated (represented) in various fields of coming human interest (it is worked out with the Axiom of Replacement/Idle Curiosity introduced later on); the Medieval philosophy of St. Thomas Aquinas on Aristotelian philosophy, the impact of Hellenistic art in the Renaissance period or in the 19th century Neo-classicism, Euclidean geometry and axiomatization in modern mathematics and logics, the Greco-Roman politics in the constitution of the United States, etc. The Parental Bent ensures that all the 'settled habitual verities of life' act as terms in the representational schema of each period. It is the veritable transhistorical omnipresence that attributes the power to these terms and renders them an output of Paternal Bent. A very similar case can be made for the perpetuation of Christianity. Going back to its beginnings in 1 AD, Christianity is the *prima facie* of self-referential universal naming, an initial presentation of {Christianity} in terms of Christianity = {{Judaist sect}, {Jesus of Nazareth}, {...}, (...)}. In formal terms Christianity is the power set of 'Second Temple period' = {The Essenes, The Zealots, The Sadducees, The Pharisees, The People of the Land, The Hellenists, (...)}. Thereon the entire Christian edifice is wrought on splits and divisions, ecumenical acts making its representation an ever more complex composition – the Christian denominations. The occurring breaks have their precise coordinates: 431 AD and 451 AD; Christianity = {{Nestorianism}, {Great Church}, Eastern Christianity, Western Christianity}. Then the 'Great Schism' of 1054, where Christianity = {{Roman Catholic Church}, {Eastern Orthodox Churches}, {Oriental Orthodox Churches}, {Church of the East}, Eastern Christianity, Western Christianity} or the 1517 Protestant Reformation that represents a new powerful recomposition, especially into Western Christianity, to mention some: Anabaptist, Anglican, Baptist,

Lutheran, Methodist, Pentecostal, Quaker, Calvinist/Reformist, etc. Surely, we could account them all to the archaic name {Judaist sect}, of which they all are descendants; however a new naming proposed initiated a recomposition. We can clearly see how the initial count of Christianity underwent hefty re-composition and representation, in a selective and adaptive mode, culminating in the ecumenical acts – as those of 431 AD or 451 AD – i.e., breaks which each time instate a *new count* or a *re-count* of existing presented multiplicities into parts *while excluding others*.

If we recapitulate: the Parental Bent instinct is an operation of prolonging the most settled habitual verities of life between generations of selective and adaptive debunking. In our set theoretical vocabulary, we have said it is the distinction between the relations of belonging and inclusion. The former presents an entirely indifferent bunch of multiplicities in the formation of habits of thought, while the latter imposes a second counting of prior existing multiples, inducing them as parts of a new representational set. What is crucial here is the demarcation between belonging elements and included parts (which are singletons i.e. properly named parts), for the second count necessarily comes in excess of the initial presentation. One other feature of capital importance is a 'positing its presuppositions', for in order to 'be acquainted' with presented elements in a situation one simultaneously needs the second count to know in the first place what are the (discerned) parts of the presented situation beforehand. While the entire initial set is also included as a part in the second count, there are one or more parts that can be presented but are not represented, meaning they do not count in a situation or world even though they exist (there can also be the obverse case, but on that later). In set theory this implies a sorting out of the Russell's paradox of self-belonging problem. Apart from this the set of subsets or the power set indicates the 'power' of a determinate representation, meaning it produces a verification of the consistency of the initial set – i.e., if everything is presented/represented according to the counts. In set theory it later becomes a question of different (infinite) cardinalities, but as for the parental bent, we shall maintain its instinctual worth in providing, simultaneously, a continual capacity accompanied with a retroactive loop returning to the initial presentation, making an endless re-verifying of the actual/current representation.

Predatory instinct \Leftrightarrow *the Axiom (Schema) of Separation*

The Axiom of Separation posits that if there exists some given set A, it is always possible to separate from it all the elements that satisfy some particular predicate and obtain from them a new set B. More formally elucidated, we can posit a set y of objects to exist when it is separated out from a previously given set z, as the subset whose members meet a condition F. Seen from the opposite angle, we are now in a position to determinate a concept and some pre-existing domain to which a determinate set of objects is subsumed. The emphasis here is on some *prior existence* of the initial set and its members, postulating different levels between sets or classes of set (see Potter 2004, pp. 41–44) – consequently introducing a cumulative hierarchy of sets, a rough set-theoretical equivalent to Veblen's notion of cumulative causality. It follows, a condition F can be any imaginable predication, as long it is confined to the basic operations of first order logic and maintains the exclusive relation of belonging – all other relations as inclusion, language, knowledge are subordinate to it, henceforth we can enumerate an infinite streak of conditions. This is also why this axiom is commonly known as an Axiom Schema of Separation and was introduced by Zermelo to circumvent the Russell's paradox and the impasse of no prior existing sets encountered by Gottlob Frege – full comprehension schema. What we gain from this axiom is a confluence of belongings and inclusions in a set and {set}, of presented inconsistent multiplicities and counted-as-one included multiplicities, all of those separated in a situation on some determinate predication. The axiom fixates for every prior existing set to have at least one subset (meaning it could be just as much an empty set $\{\emptyset\}$) when verified against some determinate property. In this way it guarantees the sets their accountability as collections instead of being 'only' fusions and, on the other hand, induces from *the theorem of the point of excess* an (in)finite reconfiguration of possible representations. All this implies that language comes second to existence, linking together and separating represented parts, only after the initial presentation took place, not the other way around.

It can be, somewhat simplistically, said that Veblen's methodological inquiry on institutional growth rests on the notions of selection (the other being adaptation) adopted from Darwinian evolutionism. Scrutinizing the instincts introduced thus far, we can interpret all of them as an analytic attribute (in the Kantian

sense of the term); be it Instinct of Self-assertion, Parental Bent, emulation or grouping, they are all a priori propositions, i.e. principles for the formation of the habits of thought. When we now proceed to the two other very important instincts – predatory instinct and idle curiosity – we have before us what we shall call a methodological shift in Veblen's genetic inquiry. He introduces these instincts by way of retrospective synthetic judgments to get the whole cultural dynamic of humankind moving. If we stay with Kant just a little bit longer, we can say that Veblen is here moving towards a transcendental subject whose synthetic acts engender 'objective' phenomenal reality by tracking qualitative leaps in cultural stages – outlining the architecture of the cumulative causation. The latter becomes a matter of a subject. We will not proceed further on this point for it would greatly exceed the limits here, nor does it impede with our pursued argument on separating capacity of the instinct. The aim here is to ponder on a language-type operation (predicate assignation), one coming in succession to some prior existence. We have said that selection is of capital importance in the shaping of habits of thought. How does this selection in a cultural evolution of humans take place? Obviously through the transformation of the habits of thought; so we need the operative capacity of differentiation (i.e. separation) between indifferent multiples. The transition from the peaceful savage era to a predatory barbarian one is a primer example of separation at work. Just to clarify our interpretation (again in the Kantian sense) of Veblen's mode of presentation on the example at hand: only in retrospect can we deduce the workings of this instinct – therefore its synthetic character. Veblen explicates this mode in *The Vested Interests and the Common Man*, stating that:

It is evident that these principles and standards of what is right, good, true, and beautiful, will vary from one age to another and from one people to another, in response to the varying conditions of life; inasmuch as these principles are always of the nature of habit; although the variation will of course range only within the limits of that human nature that finds expression in these same principles of right, good, truth, and beauty. So also, it will be found that something in the way of a common measure of truth and sufficiency runs through any such body of principles that are accepted as final and self-evident at any given time and place, - in case this habitual body of principles has reached such a degree of poise and consistency that they can fairly be said to constitute a stable point of view. It is only because there is such a degree of consistency and such a common measure *of validity* among the commonly accepted principles of conduct and belief *today*, that it is possible to

speak intelligently of the *modern point of view, and to contrast it with any other point of view* which may have prevailed earlier or elsewhere, as, e.g., in the Middle Ages or in Pagan Antiquity. (Veblen 1919b, p. 3, emphasis added)

The Predatory Instinct is the first or 'generic' separation known to man in the evolution of mankind. On the other hand, it is intimately connected with the 'earliest occurrence of ownership', exploit and seizure, outgrowing in the transition from the peaceable savage to predatory barbarian. It becomes the generic operation in cultural evolution of human animal, for it primarily renders intelligible the act of separating oneself from group homogeneity according to some property – e.g. ownership. This is precisely what the axiom of separation enforces: among a multiplicity of individuals (who are themselves multiplicities) counted as a grouping, following the application of predatory traits (combining axiom of extensionality/emulatory instinct) (see Veblen 1914, p. 161), we gain newly formed multiplicities, i.e., 'individuated groups', singletons – proper names. Formerly associated members of a group become dissociated with the latter, whence forth the material conditions and the usage of new technology come to disengage the individualistic, self-interested spirits of man. The conditions of material and use of new technology both represent the opposite (exogenous) pole in the dialectic of man and nature. However, as Veblen emphasizes it, the transition from peaceable to predatory phase is of spiritual rather than mechanical difference – although the limits of its scope are of mechanical kind.

How obstinately this instinct prevails throughout history can be observed in different historical forms (of separation) that have emerged from it. An example of such can be made of industrial activity in the recent past, feudal relations to land, to more primitive types as in the acquisition of loot and booty along with the exploit of slaves or women. A more concrete example Veblen uses comes in the form of separating salesmanship from workmanship. Once the technological advance brought new pecuniary conditions it sought a new 'division of labor' between industrial work and business affairs, the latter becoming the driving force in the whole of industrial society. The separation inbred a new class of businessmen handling and manipulating ownership for the purposes of wealth accumulation. The business principles here deployed are primarily of a salesmanship character – becoming society's personified ideal (see Veblen 1914, pp. 213–218). The essential consideration here is that these salesmanship

business principles come to plague the modern theoretical situation in economic theory, i.e. they shape the modes of its inquiry, naturally on pecuniary bent of calculating pleasures and pains in market exchange.

What do we make from all of this? We are still entirely confined in the abstract meta-realm of structuring the habits of thought. Hopefully, what can be discerned by now is the intuitive mode of how habits of thought can be formulated and advanced. The Axiom Schema of Separation or Comprehension supplies us with yet another, and also absolutely crucial, formulae for the progression and structuring of habits of thought. In set theoretic terms it supplies us with a useful tool for enacting an infinite number of consistent (represented, counted-as-one) multiplicities out of inconsistent domain of multiples. It is also known as the subset axiom (H. B. Enderton) or the axiom of comprehension (K. Kunen), even more highlighting the fact that for a *pre-existing* set we can always arrange at least one subset – a multiplicity as a (set) collection, possessing the property of a container as well as contents of that container, i.e. a and $\{a\}$. On the other hand, it also shields us from the logical impasses brought up by Russell's paradox and Frege's aprioristic positing of existence. To fully grasp the potentialities of forming habits of thought we have to also elaborate on the second of the pair: selection and adaptation.

Idle curiosity \Leftrightarrow the Axiom of Replacement (or Substitution)

Basically, the Axiom of Replacement is a similar schema axiom as that of Separation. While the latter is a predicate verification schema that can be derived from the combined application of the Axiom of Replacement and the Axiom of the Empty Set, the Axiom of Replacement is actually a function mapping between two existing sets. Consider having a set A and some set formula f acting upon S , then there also exists a set B such that $x \in B$ if and only if $x = f(y)$ for some $y \in S$. What the axiom states is that we can always start with a set A and some function f and map one-to-one, i.e. replace, each member $x \in A$ with $f(x)$. Because we operate with different presented multiples that are among themselves equally indifferent in terms of content, we can stipulate that the axiom validates every substituted element of a multiple. A remarkable property of this axiom is the fact, that although the elements of some given presented multiples are substituted

with other elements, the represented multiple, i.e. count-as-one, retains its consistency and is indiscernible by elements. This again confirms the content-neutrality of multiples with regard to their representational count. The axiom is in this sense concomitant to the Axiom of Extensionality for comprehending the elements of each set indistinguishable under the count-as-one operation; the set remains the same although a mapping of its entire domain to a new range has occurred. An important consequence stemming from this is that we have an identity through difference, or put more succinctly, we have the notion of identity absolutely oblivious of any predicative determination.

The central object of Idle Curiosity is scientific inquiry. Veblen uses a picturesque, almost antique-like metaphor to describe its functioning as a playful attitude of the young, men or lower animals, carelessly observing a sequence of phenomena in forming the scientific spirit. It is from this vantage point that Veblen deploys the critique of Classical Economics of Adam Smith and his successors, their astuteness to conform to animistic and anthropomorphic inclinations. They all ascribe to some spiritual or teleological end, to static analysis instead of evolutionary and dynamic causal framework of real-world phenomenal occurrences and events. The nature of Idle Curiosity is of the latter character, working out the habitual scheme of life as it composes a body of knowledge of different stages in human development of institutions. Take Veblen's discussion of the transition from peaceful savage stage to predatory barbaric plane: 'When presently a transformation is made in the scheme of culture from peaceable life with sporadic predation to a settled scheme of predaceous life, involving mastery and servitude, gradations of privilege and honor, coercion and personal dependence, then the scheme of knowledge undergoes an analogous change' (Veblen 1919a, p. 10). Adaptation changes the approaches in a given scheme of life, traversing individual and communal handling of affairs and transgressing deities for the creation of useful products, land for workshop manufacture and industrial mechanization, animistic preconceptions for matter-of-fact ones, and so forth. The scientific inquiry moulds the apprehension of attained knowledge and forces it into systematization. 'The objective end is a theoretical organization, a logical articulation of things known, the lines of which must not be deflected by any consideration of expediency or convenience, but must run true to the canons of reality accepted at the time.' (Veblen 1918, p. 8) The 'reality accepted at the time'

is to be understood as our representational count of multiples, for '[T]hese canons of reality, or of verity, have varied from time to time, have in fact varied incontinently with the passage of time and the mutations of experience' (Veblen 1918, p. 8). The endless process of mutations and adaptation has to bring about all of the accumulated knowledge hitherto, adhering to the principles of cumulative causation, i.e. building up the cumulative hierarchy, is an *operation of continuous mapping* of propositions, theorems, principles or axioms to correspond to scientific progression. A very simple illustration how the axiom works can be given: take an existing set $A = \{-2, -1, 0, 1, 2\}$ and have a function that arranges for a set of even numbers i.e. $f(x) = 2x$; the axiom then guarantees the existence of an Other set, $B = \{-4, -2, 0, 2, 4\}$. If we now expand our set-universe we can show on a well-known concept in physics – gravity – how the axiom also might be employed. We will consider the case of a revolutionary change in the theory of gravity in:

(17th to 20th century) Theory of Gravity = {{Newton}, {central forces}, {mass}, {space}, {time}, {force}, {inertia}, {three-dimensional, scalar, linear}, Newton, Hooke, Wren, Halley, mathematics, central forces, mass, space, (...)}

is adapted and mapped to

(post 20th century) Theory of Gravity = {{Einstein}, {relativity}, {curvature in spacetime}, {energy}, {space-time geometry}, {momentum}, {four-dimensional, tensorial, non-linear}, Einstein, Faraday, Maxwell, relativity, (...)}

There are numerous similar examples given in the history of science. It would also be of considerable ease to find cases in other institutional planes of society. There are of course also situations with unsuccessfully finished mappings, such being the case with economics, as Veblen tells us. The economic science has not yet completed its replacement of canons of thought since Adam Smith introduced his manual handicraft conception of the mechanics of industry. The (contemporary, neoclassical) economic science has, without succumbing to the progression in the mode of production, retained these preconceptions of inculcated trades of free exchangers of 19th century private property in the spirit of natural liberties. All these bearings also come in relation with Leibniz's (constructivist closed-end orientation and God's guarantee of) sufficient reason instead of incomplete and

non-teleological open-ended cause and effect – these former underlying nuances still very much prevailing in contemporary textbook economics.

What they all have in common is the lack of any sensibility to difference as such; from the point of view of an external observer, as in Romantic times or that of today. Both theories of gravity are of equal validity, are theoretically equivalent *prima facie* and in this way share an identity. Their respective epistemological richness is validated only *ex post* in experience. This is true because the representational count (of included parts) is indifferent to any predicates, meaning that difference has no particular content-determination. In presentation of multiplicities everything is replaceable as long as one maintains one-to-one mapping, i.e. maintains the 'size' or cardinality of a given set remains the same.

Modus ponens of technological (determinism) materialism \Leftrightarrow the Axiom of Foundation

As with all (except Axiom of Extensionality) of the previous axioms, the Axiom of Foundation asserts an existence of a certain set, except this time for a more specific reason and in a slightly different way. It posits that an asserted existing set is an element of another given set – hence no new sets are proposed. The axiom was introduced to overcome the problems and paradoxes arising from the circular reasoning in the naïve set theory – the already mentioned famous Russell paradox, Frege's impasse, and so on. Another way of putting it, because all of the members of a set are required to exist beforehand implies one cannot have a set that is immediately and only an element of itself. There must always exist in a given set, as a member such an element, whose contents are not elements of the initial set – ruling out the existence of a set of all sets. Put in little more formalistic terms, the axiom states that given a non-empty set A there exists an element X , $X \in A$ such that $X \cap A = \emptyset$. Let us give an example: say we have a set like $A = \{x, \{x\}, \{y\}, \emptyset\}$; let us also suppose that $x \neq y$. We have a situation where there are presented element x , singletons $\{x\}$ and $\{y\}$ and the empty set. Now, observed from the interior of this situation, the singleton $\{a\}$ has its contents presented in the membership of a , and $a \in \{a\}$ holds. What about $\{y\}$? The multiple y is not presented in the set A and we therefore cannot know what is inside the container $\{y\}$, it is in this sense indiscernible from the empty set, \emptyset ,

or any other set as well. We have both $\{y\}$ and \emptyset as potential candidates for foundation of the set A.

Say we have a progressing set $\{x_0, x_1, \dots, x_n\}$, if you then posit $x_{n+1} \in x_n$, this would surely violate the foundation as we would have also $x_n \in x_n$. What necessarily follows is a halting point for any infinite descending sequence according to the rules of belonging \in . So, for any set x_0 running such a sequence we would inevitably end up having to postulate the initial term as, $x_0 = \emptyset$. This also illuminates the process how ordinals are constructed. If we take for example the construction of natural numbers, we get for e.g., number $2 = \{\emptyset, \{\emptyset\}\}$. Their construction lies in the simple application of the axioms of union and empty set. Naturally, we need not orient ourselves only in mathematical universe. Consider a different example, applied by Badiou: take a set of Living Beings = $\{\{\text{cat}\}, \{\text{dog}\}, \{\text{mouse}\}, \text{animals}, \text{organs}, \text{tissues}, \text{cells}, \dots\}$, we could further dissect each element to Animals = $\{\{\text{liver}\}, \{\text{brain}\}, \text{organs}, \text{tissues}, \text{cells}, \dots\}$, etc. But when it comes to Cells = $\{\text{organelles}, \text{molecules}, \text{elements}, \text{atoms}\}$ we can evidently see that the set Cells is included in the set of Living Beings, but it simultaneously has members that cannot be characterized as living (Badiou 2008, p. 71).

It would be beyond the scope of this inquiry to go deeper into the ramifications of ordinals, well-orderedness, cardinals and the infiniteness of them out of which Badiou develops his notion of the Event – his pinnacle theory for dynamism and change in his otherwise static set theory ontology. We will rather keep things simple and uphold the primary distinction between the structure and meta-structure, i.e. between presentation and re-presentation of multiples or between belonging and inclusion, and take for granted Badiou's classification of *Being and beings* in natural and historical situations (there also exist neutral situations, but we do not need them for our argument) (see Badiou 2005a, Meditation 12, pp. 130–141 and Meditation 16, pp. 173–177). The gap separating being from beings comes from the point of excess of sets and their power-sets – presentation and re-presentations – from where different situations may arise. First, *natural situations* are those having *all* elements normally presented and represented in a situation at once. A model for this kind of structure can be found in that of natural numbers, as already shown above these are constructed as ordinals, meaning they are 'built' solely by reapplying the empty set by union and obeying (homogeneous) transitivity – the strict unfolding of sequential

cause and effect. Transitivity derives immediately from the concept of ordinals [7], meaning they are well-ordered and where the *empty set* \emptyset is the only element that can always be presented and not represented (recall the theorem of excess) so that the Axiom of Foundation holds. It is the 'ontological' law of the Nature the way in which this progression of natural multiplicities works – it goes in the same way as the construction of ordinals. As Badiou remarks, Nature in-itself entails no extraordinary elements because it is *per se* a normal progression without any immanent contradictions, meaning there are no immeasurable gaps or singular moments of subjectivity. Every presentation is immediately also a representation, nature knows no opaqueness; nature is a self-homogeneous, open-ended entity, advancing historically on the void. Hence, the appropriate model: ordinal numbers such as natural (\mathbb{N}) or whole (\mathbb{Z}) numbers. Second, we encounter *historical situations* similarly as natural ones, founded on some particular element, only this time it is not an empty set (although, as we have seen, from inside the presentation we cannot 'know' whether a container is actually void or is rather non-void, i.e., *singular*), but it has to be one possessing no elements that belong to the initial situation. Herein lays the entire potentiality of a change and the capacity of an actual event if the consequences are followed through and maintained. As we have already seen, how immense a potential change is, depends precisely on the gap separating the set and its power over a determinate cultural scheme of life.

It comes as an astonishing fact that Veblen clearly anticipated change in the habits of thought and life in a parallel fashion best seen in his elaboration of the progression of the *state of industrial arts*. Now, how did he determine the accumulation of technological knowledge, which for his acknowledgement of technological determinism [8] actually represents an onto-logical ground? Let us ponder on a quote from *The Instinct of Workmanship*:

In the main, the state of the industrial arts is always a heritage out of the past; it is always in process of change, perhaps, but the substantial body of it is knowledge that has come down from earlier generations. New elements of insight and proficiency are continually being added and worked into this common stock by the experience and initiative of the current generation, but such novel elements are always and everywhere slight and inconsequential in comparison with the body of technology that has been carried over from the past. (Veblen 1914, p. 103)

These 'new added elements' guarantee for a situation, apart from sustaining the monotonous coherence of natural order, in effect also an infusion of a *sine qua non* gesture (positively and negatively) of change. First, it imposes a cut into the institutional fabric of determinate cultural plane leading to a *forced discontinuity*, both in habits of thought and social actuality (see Veblen [1899]1922, pp. 117–120). Second, it retains the inexistence of the One or Totality, the prohibition of the inward loop that would otherwise close in on itself, thereby prolonging the open-ended consistency. One should read them here in the sense of 'cells' described above; the natural working of cultural growth has many ramifications and modifications entertained in passage of new elements, but some will eventually result in a reshuffling of a particular situation. Recall the axiom of foundation: a foundational element is the one that shares nothing in common with any of the other presented elements. Therefore, because it is a forcefully imposed new element in a situation it has a formal characteristic of belonging 'only' to itself, say $X \in X$ (in set theory these are called *extraordinary sets*), and is simultaneously not the void set \emptyset , i.e. it is non-empty. This indiscernible eventual element inscribes an immeasurable gap between the presentation and re-presentation – it marks the beginning of a sequence of change. In Veblen's analysis these elements take the forms of technologically material and immaterial presuppositions, those conditioning the surpassing of different cultural planes. We could identify the following: the transition from savage to lower barbarian phase is marked with the development and usage of tools and weapons, and also of self-interest, predatory inclinations and cult objects and worship rituals. Later in the predatory phase the introduction of ownership takes place, along with the introduction of the notion 'surplus' in the newly approbated technological scheme for both individuals as groups at large. In more recent history the two of the most notable determining factors range from the handicraft material equipment and mechanical processes to turning over a pecuniary gain from marketable merchandise and economic efficiency resting on Natural Rights/Liberty, and for our own times, the systematization of the industrial process and algorithmic precision and the business principles of large corporations.

What we have tried to call here the *modus ponens* is the implicating subjectivity of change resting on new added elements, whose retroactive positing deduces their final outcomes. We cannot know which elements of today will be

historicized in the future but, on the other hand, do know that the machine industry did shape the scheme of life in the late nineteenth and first half of twentieth century, prolonging the situation to the present-day. When we stumble upon singular elements that are identified as belonging only to themselves, and are not void, their novelty and fidelity to the consequences they bring overturn old situations into new ones. The situations are in this sense being re-counted according to the new structure of the presented elements and organized into a new framework, where the Axiom of Foundation again gets a grip on the consistency of the represented terms.

Concluding remarks – materialist grounds for a new theory

Zermelo-Fraenkel set theory and Veblen's institutional economics have both in their own ways crucially influenced how we today think in mathematics and economics, respectively. Although both of these theoretical bodies were conceived in roughly the same period it cannot be shown or maintained they had impacted each other in any direct way. There is, however, a more philosophical, universalist, inclination to capture a meta-theoretical discourse at work when inquiring about baseline frameworks of either of the two disciplines. It also does not mean we infer any kind of coinciding between psychology (and human instincts) and mathematics (axioms as meta-mathematical propositions). We rather argue that Veblen's appropriation of psychology and human instincts, with his usage to determine the habits of thought and unfold onto institutions, incorporates an *axiomatic mode of thinking* his entire architecture of institutional framework – not only by chance, but also by import of implicit methodological and epistemological predeterminations of disciplines employed, such as psychology, etc. There are two aspects we have to consider when ascribing to Veblen an axiomatic mode of thought. First, the instinctual dispositive attributes to institutional frameworks an axiomatic character by establishing a prescriptive immanence of a determinate (axiomatic) mode of thought – as *comprehension* of conceivable conditions satisfying a formal system. Second aspect, however, has to do with the way Veblen sees the methodological/epistemological side of his theorizing – usually described (also by his own writing, see e.g., Veblen 1919a, pp. 32–38) as process-open, non-teleological, non-foundational, cumulative, holistic, regional/general, etc. Akin to these principles we can locate also those of

axiomatic thinking – *of extension*: once we posit something as open-ended a decision and choice become necessary, hence new elements are added. Next, when we say non-teleological are we not in fact inferring the prohibition of the One (there are multiple presentations that may count as one) and opting for a hereditary cumulative hierarchy as a site of (cardinally) ever larger sets of institutions? The prohibition of the One consequently posits the multiple as being and thought in its form of manifestation as an institution (and e.g. a capitalist institutional framework). In such mixture of parts and wholes thinking is intrinsically axiomatic inasmuch it prescribes parts through a given generality, viz. axiom, as opposed to Veblen's much criticized notion of taxonomy (determinate definitions of concepts in economic science such as value, labour, rent, profit, wage in terms of natural law), and consequently delivers no pre-determined extension to a concept or object.

If this retroactively becomes the case then we could strengthen Veblen's presence on a universal list of thinkers, producing metaphysical and materialist theories from a contemporary philosophical point of view – accompanying the names such as Hobbes (mechanical materialism), Feuerbach (anthropological materialism), Marx and Engels (historical materialism), and then Veblen (technological materialism/determinism).

Let us reiterate and sum up our entire reading of Veblen with the following inverse premise: *there would be no institutions, if it were not for the habits of thought. But habits of thought have, on the other hand, a specific set of rules of inference and, as with every set of rules, there has to be an initial proposition, as we always have a zero-ith axiom of a given theory, the most elementary coextensive one to all other axioms.* This mode of reasoning is a property of any kind of axiomatic thinking. Starting with Euclid's axiomatics, the axiomatic method is one of the most important contributions of ancient Greeks to our wealth of knowledge, transgressing the boundaries of mathematics to arrays from applied and social sciences to humanities and metaphysics. It posits an abstract, logically transparent formalized open structure, where axioms maintain isomorphic relationships between different domains of knowledge (theories) and single out invariant elements among them. With Zermelo, the main issue for set theory and meta-mathematics shifts from the question: 'What sets are, intrinsically?' to 'What is the appropriate *method* of presentation and

concatenation of sets?' The answer was: axiomatic thinking and the formalization of the method. Veblen needed a similar rationale to resolve the prevailing cultural traditions pervading capitalism in the late nineteenth century; what were the 'hidden/abstract' motives driving human subjects to think as they think, to act as they act, forming particular habits of thought and forging institutions. In conclusion we can argue that instincts, understood as axioms of an institutional framework, formally inscribe the epistemological component of his economic sociology and it was Veblen's genius to implement it in his writings without any recourse to (mathematical or other) formalization. However, it is time to progress further.

Endnotes

[1] Wilhelm Wundt also held letter correspondence with the inventor of set theory, Georg Cantor, particularly on the existence of potential and actual infinities (see Cantor 1962).

[2] For a general introduction to the axiomatic method in foundations of set theory, see Fraenkel, Bar-Hillel and Lévy 1973, pp. 15–153.

[3] For the purposes of this inquiry we do not deal with the axiom of infinity, since it has implications and consequences that would far exceed the current analysis.

[4] Veblen's own definition is usually quoted as follows:

As a matter of course, men order their lives by these [current, business-like scheme of economic life] principles and, practically, entertain no question of their stability and finality. That is what is meant by calling them institutions; they are settled habits of thought common to the generality of men. (...) Like all human culture this material civilization is a scheme of institutions — institutional fabric and institutional growth. But institutions are an outgrowth of habit. The growth of culture is a cumulative sequence of habituation (...). (Veblen 1919, p. 239)

[5] Consider the following example of a situation U:

$$U = \{\{a, b\}, \{a\}, a\}$$

The axiom of extensionality states formally that: $\forall u (u \in X \leftrightarrow u \in Y) \rightarrow X = Y$,

If we take that $a \neq b$, we have that $a \in \{a\}$, and $a \in \{a, b\}$. Since $a \neq b$ we have that $\{a\} \neq \{a, b\}$, however the axiom states that for all $x \in U$ we have equivalence: $x \in \{a\} \leftrightarrow x \in \{a, b\}$.

This is because U in itself possesses no information about b . It just 'knows' that it has two sets belonging to it and the presentation of a : it knows only $\{a, b\}$ and $\{a\}$ as wholes and that they are two distinct 'beings'. It cannot discern between the two in terms of \in -relation.

[6] The other main source of his (anthropological) defining of the concept emulation is brought forward in the introduction to *The Theory of the Leisure Class* (see Veblen [1899] 1922, p. 16)

[7] One of the simplest definitions of a transitive set is that whenever $x \in A$, and $y \in x$, then $y \in A$. We can also state it as following: every element of the set is also a subset. Set A is transitive when belonging implies inclusion: $x \in A \rightarrow x \subseteq A$. John von Neumann introduced a definition of ordinals to attain hereditary transitive sets (whose members are also transitive, i.e. are also ordinals themselves) leading to a construction of a von Neumann cumulative universe. Such cumulative hierarchy has for its zero-ith element, the $V_\alpha \mid V_0 = \emptyset$.

[8] Veblen makes a clear concomitance of the habits of thought and technological determinism. He writes in a footnote to *The Instinct of Workmanship*: 'These habits of thought (institutions and principles) are themselves the indirect product of the technological scheme' (Veblen 1914, p. 146).

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Conflict of Interest Statement

The author declares that this research has no conflict of interest.

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Uroš Kranjc is a research fellow at Institute of Philosophy, Research Centre of the Slovenian Academy of Sciences and Arts and a former Marie Skłodowska-Curie Actions Fellow at the University of York (UK) (uros.kranjc@guest.arnes.si).