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Dicisigns and Habits

Implicit propositions and habit-taking in Peirce's pragmatism

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"Dicisigns" is the concept developed by Peirce, in the context of his post-1900 generalized semiotics, in order to cover his vast generalization of standard conceptions of propositions. In his mature semiotic architectonic taking its beginnings with the *Syllabus* (1903), Peirce generalized the basic trichotomies of *term-proposition-argument* and *icon-index-symbol* to become, each of them, exhaustive, so that all signs will be either a term, a proposition, or an argument, as well as an icon, an index, or a symbol.¹ During the composition of the *Syllabus*, yet another trichotomy, that of *qualisign-signsign-legisign* was added as the first one, giving rise to the possibility of combining the three trichotomies to give the *Syllabus* table of ten combined sign types. The later extensions of Peirce's semiotics, particularly in the Lady Welby letters, in terms of further trichotomies, up to a total of at least ten trichotomies, were established with the same claim for exhaustivity in order to fit the same combinatorial pattern, famously giving a total of 66 combined signs. As to the conception of propositions in particular, the generalization indicated by the neologism "Dicisigns" (also "Dicent Sign", "PHEME", etc.) vastly extended its range from linguistically expressed truth claims to include propositions using diagrams, pictures, gestures, etc. as well as a vast swathe of "quasi-propositions" covering more or less natural signs such as weathercocks, fossils, etc.

The rationale behind this generalization was the interconnected definitions of Dicisigns 1) by means of their ability to take a truth value and 2) by their functionally interpreted predicate-subject structure, according to which they function by means of simultaneously indicating an object and describing that same object. In *Natural Propositions* (Stjernfelt 2014), I attempt to give a reconstruction of Peirce's elaborated theory of propositions as well as to indicate an overview over actual interpretation possibilities of that theory. In this paper, I shall attempt to investigate the relations between the Dicisign doctrine and the central conception of "habit" in Peirce's logic, semiotics, and metaphysics. An immediate connection is indicated by the fact that most non-quasi propositions are symbols, and Peircean symbols are defined by their object connection relying on a habit: "A Symbol incorporates a habit, and is indispensable to the application of any intellectual habit, at least." ("Prolegomena to an Apology for Pragmaticism", 1906, 4.531) – the implication being that such propositions, often referred to by Peirce as "beliefs", hold not only for the moment, but rely upon thought habits holding also for an indefinite future. So, beliefs are propositions as well as habits and thus function as a basic, important connection between the two concepts: *beliefs are those habits which are also propositions*. Further investigation, however, reveals a series of complications to this simple scheme, taking us deep into fundamental structures and issues of pragmatism.

Aspects of Habits

¹ The "or" in the claim was not an exclusive-or - a sign may be *both* an icon, an index, and a symbol, etc. but no sign may belong to a fourth category.

A major issue is that Peirce's conception of habit, central as it is to pragmatism and semiotics alike, appears as somewhat less well-defined than most of the other central concepts of that edifice. Even if habit is central already in his early 1860's papers, Peirce's conception of it changes considerably over the years. Let us run through some of the ambiguities or tensions involved.

A first important complication is that symbols involve *two* set of habits, that of the sign itself, as a rule-bound legisign capable of repetition, and that of the purported behavior of the object referred to by the symbol: "The word and its meaning are both general rules" (*Syllabus*, 1903, 2.292f, see also Nöth, 85; Pietarinen & Bellucci in prep, 3). One thing is the habit, which governs the production of still new replicas of the symbol sign itself; another is the habit claimed to govern the behaviour of the object referred to by that symbol. The former belongs to symbol expression in semiotics, the latter belong to the meaning expressed - and, if the symbol is true, to the (type of) objects referred to. Thus, the propositional symbol accounts for some of the habits of the object indicated: In contrast to the icon and the index, intellectual conceptions convey more about their object "... than any feeling, but more, too, than any existential fact, namely, the 'would-acts', 'would-dos' of habitual behaviour; and no agglomeration of actual happenings can ever completely fill up the meaning of a "would-be."" ("Pragmatism", Ms. 318, 1907, EP II 402, 5.467).

Habits in the Pragmatic Maxim

These, however, are results of Peirce's mature semiotics. As early as in Peirce's 1866 writings, habits appear as one of three basic elements of the mind, to be introduced as categories in "A New List" the year after. He claims that there are "... three kinds of inference: 1st, Intellectual inference with its three varieties Hypothesis, Induction and Deduction; 2nd, Judgments of sensation, emotions, and instinctive motions which are hypotheses whose predicates are unanalyzed in comprehension; and 3rd, Habits, which are Inductions whose subjects are unanalyzed in extension. This division leads us to three elements of consciousness: 1st, Feelings or Elements of comprehension; 2nd, Efforts or Elements of extension; and 3rd, Notions or Elements of information, which is the union of extension and comprehension." ("Consciousness and Language", 1866, 7.580). Here, the three categories are thus closely connected to the extension and intension of propositions serving as conclusions to inferences. Already here, habits are thus allied to propositions: a) they are inferred from vague inductions; b) their information is what is provided by propositions. Extension and intension being independent in propositions, the product of the two is taken to form the information they carry. Importantly, habit constitutes a structural element of mind which is not actually present at all times and whose type and degree of consciousness shall continue to form a matter of contention for years to come, cf. below. More generally, habit shall continue, during Peirce's development, to appear as one of the major, regular means of characterization of the category of Thirdness, along with Continuity, Generality, Law, etc. of which it is sometimes a synonym, othertimes a subtype.

A particularly central role is played by habit in the articulation of the Pragmatic Maxim,² allegedly taking its beginnings in the early 70s and appearing in its classic formulation in the 1878 papers. Inspired by Alexander Bain's definition of Belief as "... that upon which a man is prepared to act", introduced in the Metaphysical Club by Nicholas St. John Green and much discussed there, the pragmatic maxim forms an analysis of belief in terms of possible action habits.³

² As observed by Colapietro 2009, 368.

³ Even late in life, Peirce continued to refer to this idea in his discussions of habit: " For our present purpose it is sufficient to say that the inferential process involves the formation of a habit. For it produces a belief, or opinion; and a genuine belief, or opinion, is something on which a man is prepared to act, and is

Here, Belief is established as a particular subtype of habit in human thought: "And what, then, is belief? It is the demi-cadence which closes a musical phrase in the symphony of our intellectual life. We have seen that it has just three properties: First, it is something that we are aware of; second, it appeases the irritation of doubt; and, third, it involves the establishment in our nature of a rule of action, or, say for short, a *habit*." ("How to Make our Ideas Clear", 1878, EP I 129, 5.397). Here, beliefs are those habits which we are aware of and which mitigate doubt. Uncontroversially, Peirce takes familiarity with the use of a notion to form the first standard step of clearness, the ability explicitly to define the notion to form the next step. Deeming these insufficient, he famously adds the third and final step of clearness to be that expressed in the pragmatic maxim: "It appears, then, that the rule for attaining the third grade of clearness of apprehension is as follows: Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object." (EP I 132, 5.402). Here, habit is involved no less than twice. The very conception itself of the possible effects of the object forms a habit of thought - thought thus taken to be a particular type of action: "the action of thinking" whose purpose is the removal of doubt. And this habit of thought, in turn, establishes a further habit of action, relating to the effects of the object, in itself transcending thought: "The *final* upshot of thinking is the exercise of volition, and of this thought no longer forms a part; but belief is only a stadium of mental action, an effect upon our nature due to thought, which will influence future thinking." (EP I, 129, 5.397). This idea of the final meaning of a concept as consisting in a habit of non-mental action shall continue to absorb Peirce in his attempts to construct a proof of pragmatism in the years after the turn of the century - cf. below. Here, the meaning of a proposition – a belief – is reducible to a claim about the conceivable effects of its object, while it is not addressed whether the resulting, final volitional action beyond thought but still governed by a general principle, also has, in itself, propositional structure. Habit being general, it possesses a schematic structure, as Rosenthal insists (1982, 231) – a diagram, as Peirce would say, incarnating the possibility of drawing particular action inferences from it.⁴

Habit, continuity and realism

A constant theme in Peirce's further development of the habit concept is its generality. A habit not only involves more than one occurrence of the relevant action, it also transcends any finite number of such instances (Letter to Lady Welby 1908 December 24, EPII 487). Even if each single such occurrence constitutes an individual event, the structure permitting the indefinite extension of such occurrences is, in itself, general and thus forms a prime example of Peirce's description of generality in terms of continuity. A habit transcends any number of actualizations, just like the continuum transcends any number of individual points, even infinite numbers. For that reason, habits form a central example of general patterns referred to by Peirce's realism of universals: habits are not themselves sums of individual existents or events, rather, they constitute patterns which possess the real power to make such existences incarnate them - even in the extreme case of never actually once becoming so actualized. Again, this structure, connecting some general rule with its possible instantiations in single cases mirrors that of propositions - consisting of indices pointing

therefore, in a general sense, a habit. ("Minute Logic", 1902, 2.148)

⁴ "Thus, when you say that you have faith in reasoning, what you mean is that the belief habit formed in the imagination will determine your actions in the real case. This is looking upon the matter from the psychological point of view. Under a logical aspect your opinion in question is that general cognitions of potentialities *in futuro*, if duly constructed, will under imaginary conditions determine *schemata* or imaginary skeleton diagrams with which percepts will accord when the real conditions accord with those imaginary conditions." ("Minute Logic", 1902, 2.148). Cf. Stjernfelt 2007, ch. 4.

out objects referred to, on the one hand, and of general predicates on the other hand. Another way of expressing said realism is that some of those general predicates describe real patterns - habits - of reality, and their presence in the mind can never exhaust them but must, by the same token, be one of a habitual disposition, different from any here-and-now content of the mind. This also becomes evident the many times Peirce recognizes that the only way of presenting a habit is by predicatively describing the general behavior sequence common to each of its instantiations:

"To get back, then, to the die and its habit--its "would-be"--I really know no other way of defining a habit than by describing the kind of behavior in which the habit becomes actualized." (*Syllabus*, 1903, 2.666)

Habits thus share the predicate/subject structure with propositions, – *general* propositions due to the inherent generality of habits. The particular occasion which calls into action the general habit acts like the object of the proposition, the ensuing volitional act appearing as an inference from that proposition, as it is described in this long and pretty early quote locating this logical habit structure in neuropsychology with a frog as example:

"The cognition of a rule is not necessarily conscious, but is of the nature of a habit, acquired or congenital. The cognition of a case is of the general nature of a sensation; that is to say, it is something which comes up into present consciousness. The cognition of a result is of the nature of a decision to act in a particular way on a given occasion. In point of fact, a syllogism in Barbara virtually takes place when we irritate the foot of a decapitated frog. The connection between the afferent and efferent nerve, whatever it may be, constitutes a nervous habit, a rule of action, which is the physiological analogue of the major premiss. The disturbance of the ganglionic equilibrium, owing to the irritation, is the physiological form of that which, psychologically considered, is a sensation; and, logically considered, is the occurrence of a case. The explosion through the efferent nerve is the physiological form of that which psychologically is a volition, and logically the inference of a result. When we pass from the lowest to the highest forms of innervation, the physiological equivalents escape our observation; but, psychologically, we still have, first, habit-- which in its highest form is understanding, and which corresponds to the major premiss of Barbara; we have, second, feeling, or present consciousness, corresponding to the minor premiss of Barbara; and we have, third, volition, corresponding to the conclusion of the same mode of syllogism. Although these analogies, like all very broad generalizations, may seem very fanciful at first sight, yet the more the reader reflects upon them the more profoundly true I am confident they will appear. They give a significance to the ancient system of formal logic which no other can at all share." ("A Theory of Probable Inference", 1883, 2.711)

Here, the logical habit taking us from the general habit proposition (the major premiss), occasioned by the appearance of the relevant particular information in a perceptual judgment proposition (the case, the minor premise), and to the action conclusion, is instantiated in the neurophysiological system - propositional habit thereby extending also to cover inherited behaviour structure (cf. below): 1) Habit: "In case of A, do B"; 2) Occasion: A; 3) Action: B. The habit proposition - the major premiss conditional - is later described as such: "Real Habit - its subject would under certain conditions behave in a certain way, even if those conditions never actually do get fulfilled" ("A Sketch of Logical Critics", 1909, EPII 457) - the "certain conditions" given in the minor premiss activate the habit conclusion. Habits in this very general sense - involving inherited biological instinct - thus form general, conditional propositions. So not only explicit, consciously adapted beliefs, among habits, are propositional. Indeed it seems that habit is propositional all the way down

to biology. In short, habit in this sense is a general, conditional proposition urging a generally described type of action to occur on given conditions. Some of those habits, of course, may be intellectual, so that the resulting action is a thought; in that case the relevant habits themselves are rules of inference.

But if all habits have a propositional structure - forming the major premiss of action arguments - beliefs are no longer those habits which are propositions. What then distinguishes beliefs? A mature version of the pragmatic maxim: "A belief in a proposition is a controlled and contented habit of acting in ways that will be productive of desired results only if the proposition is true." ("New Elements" (Kaina stoicheia) 1904, EPII 312). The subtype of habits which is beliefs are now those subject to *control* (cf. below). This is obviously a different criterion from that of the 1878 pragmatic maxim where the defining feature of beliefs as habits were awareness and assuaging of doubt.

Importantly, these structures give rise to a couple of corollaries. One is the mirror definition of doubt as something which is only real if it actually breaks an already existing belief. Already from the Metaphysical Club period, thus, Peirce refuses "parade" doubt⁵ which may be expressed explicitly but which is not evidenced by hesitation or changed behavior, that is, without effects upon habit. The pragmatic maxim is therefore also a means to distinguish real doubt from parade doubt: "A true doubt is accordingly a doubt which really interferes with the smooth working of the belief-habit. Every natural or inbred belief manifests itself in natural or inbred ways of acting, which in fact constitute it a belief-habit. (I need not repeat that I do not say that it is the single deeds that constitute the habit. It is the single "ways," which are conditional propositions, each general)." ("Consequences of critical Common-Sensism", 1905, 5.510). We remark in the passing that belief-habits may be inbred and are thus *not* subject to explicit control, unlike beliefs in the 1904 quote above.

Another corollary is the realization that the existence of conscious habits necessitates that the mind has direct access to general objects, that is, not fully determined objects - not unlike Husserl's notion of "categorical intuition": "We can understand one habit by likening it to another habit. But to understand what any habit is, there must be some habit of which we are directly conscious in its generality. That is to say, we must have a certain generality in our direct consciousness. Bishop Berkeley and a great many clear thinkers laugh at the idea of our being able to imagine a triangle that is neither equilateral, isosceles, nor scalene. They seem to think the object of imagination must be precisely determinate in every respect. But it seems certain that something general we must imagine. (...) At any rate, I can see no way of escaping the proposition that to attach any general significance to a sign and to know that we do attach a general significance to it, we must have a direct imagination of something not in all respects determinate." (5.371 Footnote 1, 1893).⁶ Habit was first introduced in order to understand structures of the mind which transcended

⁵ "...for it is the belief men *betray* and not that which they *parade* which has to be studied." ("Issues of Pragmaticism", EP II, 349n)

⁶ An important variant idea occurring several times in Peirce is that beliefs, pragmatically defined, are *at odds* with propositions of science (despite the fact that the maxim was originally conceived of as a meaning clarification procedure for scientific terms). Thus, in 1898, he says ("Cambridge Lectures on Reasoning and the Logic of Things: Philosophy and the Conduct of Life", 1.635) the following. "... I hold that what is properly and usually called *belief*, that is, the adoption of a proposition as a {ktéma es aei} to use the energetic phrase of Doctor Carus, has no place in science at all. We *believe* the proposition we are ready to act upon. *Full belief* is willingness to act upon the proposition in vital crises, *opinion* is willingness to act upon it in relatively insignificant affairs. But pure science has nothing at all to do with *action*. The propositions it accepts, it merely writes in the list of premisses it proposes to use. Nothing is *vital* for science; nothing can be. Its accepted propositions, therefore, are but opinions at most; and the whole list is

immediate consciousness. But the fact that the mind is able to make conscious (some of) those habit structures has important consequences for the contents also of immediate consciousness. The fact that it is indeed possible to be aware of a habit is thus of central importance: this necessitates the controversial existence of not-fully determined, general, representations.

To sum up, habit is a conditional, general proposition, realist in the sense that it covers an indefinite amount of possible instantiations, which, given the appearance of a particular occasion of a certain general description, leads to action, generally described. Explicit beliefs, as a subset of belief-habits, are the subjects of awareness and of control.

Acquired habits, innate habits, laws

Until now, we have implicitly assumed that habit is something generalized from the human mind to cover other types of biological cognition, cf. the frog example. But as so often with Peirce, generalization must be driven as far as possible. A controversial and pretty consistent implication of the Habit doctrine, cf. the frog example, is that habit not only extends to animals but also spans across the received innate/acquired distinction, coming out of the principle of using "If I may be allowed to use the word "habit," without any implication as to the time or manner in which it took birth, so as to be equivalent to the corrected phrase "habit or disposition," that is, as some general principle working in a man's nature to determine how he will act, then an instinct, in the proper sense of the word, is an inherited habit, or in more accurate language, an inherited disposition. But since it is difficult to make sure whether a habit is inherited or is due to infantile training and tradition, I shall ask leave to employ the word "instinct" to cover both cases." ("Minute Logic", 1902, 2.170). This, however, is not only a *façon-de-parler*, rather it is an ontological claim which insists that there is no principal difference between habits acquired during the phylogenetic course of evolution and habits acquired in the ontogenetic development of the individual: "The old writers call [them] dispositions, but I do not think there was any advantage in calling them by a separate name, but rather the reverse. Some call them 'hereditary habits'. If they are that, they are innate." ("Materials for Monist article", 1905, Ms. 288, 65-67). The basic idea that one of the essential elements of every possible mind is habit excludes the possibility that habits as such could be accidental developments during individual lifetime only: "... every animal must have habits. Consequently, it must have innate habits. In so far as it has cognitive powers, it must have *in posse* innate cognitive habits, which is all that anybody but John Locke ever meant by innate ideas. To say that I hold this for true is implied in my confession of the doctrine of Common-Sense -- not quite that of the old Scotch School, but a critical philosophy of common-sense. It is impossible rightly to apprehend the pragmatist's position without fully understanding that nowhere would he be less at home than in the ranks of individualists, whether metaphysical (and so denying scholastic realism), or epistemological (and so denying innate ideas)." ("Consequences of critical Common-Sensism", 1905, 5.540).

Thus, Peircean habit does not comprise only patterns of behaviour acquired in the ontogenetic timescale of individual organisms, but also patterns of behavior acquired in phylogenetic timescale

provisional. The scientific man is not in the least wedded to his conclusions." - a similar argument is repeated five years later (7.606). The idea seems to distinguish the definition of conceptions by the sum of conceived effects of their objects, on the one hand, and the action consequence inferred from (some of) those effects – so that the latter is reserved for "vital" issues only, remote from the cool, detached relation of the scientist to his results. In this variant idea, then, "beliefs" differ from scientific propositions, radically narrowing the explicitly broad definition of "belief" so as to cover any assent, of some endurance, to a proposition.

of species lineages.⁷ Despite the fact that the "narrow" interpretation of habit to cover only the former is widespread, even to the degree that it forms a prejudice of our time, the biosemiotic idea that there is no deep ontological distinction between the two is supported by Peirce's argument. Inherited habits, thus, form implicit conditional propositions ready to give inference to action if perceptual occasion adds the relevant minor premiss needed.

Given that Peircean habits thus pervade biology, the next issue called for by tentative generalization is whether they extend into the pre-biological, purely physical universe as well. Immediately, there is a tendency to the exact opposite, to strongly contrast habits to physical laws. In Peirce's first major outline of a cosmology, the "Guess at the Riddle" (1887), e.g., he describes habits in terms of neurophysiology, generalizing the frog example and anticipating Hebb's law that connections used are connections strengthened:

"Fourth, if the same cell which was once excited, and which by some chance had happened to discharge itself along a certain path or paths, comes to get excited a second time, it is more likely to discharge itself the second time along some or all of those paths along which it had previously discharged itself than it would have been had it not so discharged itself before. This is the central principle of habit; and the striking contrast of its modality to that of any mechanical law is most significant. The laws of physics know nothing of tendencies or probabilities; whatever they require at all they require absolutely and without fail, and they are never disobeyed. Were the tendency to take habits replaced by an absolute requirement that the cell should discharge itself always in the same way, or according to any rigidly fixed condition whatever, all possibility of habit developing into intelligence would be cut off at the outset; the virtue of Thirdness would be absent." (1.390)

The "Law of Mind" cosmology of the first series of *Monist* papers around 1892 sophisticates that point: "The law of habit exhibits a striking contrast to all physical laws in the character of its commands. A physical law is absolute. What it requires is an exact relation. Thus, a physical force introduces into a motion a component motion to be combined with the rest by the parallelogram of forces; but the component motion must actually take place exactly as required by the law of force. On the other hand, no exact conformity is required by the mental law. Nay, exact conformity would be in downright conflict with the law; since it would instantly crystallize thought and prevent all further formation of habit. The law of mind only makes a given feeling more likely to arise. It thus resembles the "non-conservative" forces of physics, such as viscosity and the like, which are due to statistical uniformities in the chance encounters of trillions of molecules." ("The Architecture of Theories", 1891, 6.23) Here, the bottom-line contrast, however, is more precisely that between conservative and non-conservative physical laws. The former are defined by dealing with those forces, like gravity, whose work on an object between two points is independent of the trajectory taken; the latter comprising particularly cases involving friction, thus the statistical laws of thermodynamics. This argument is allied to Peirce's simultaneous idea of the objective existence of chance – the absence of "exact conformity" being responsible for merely statistical tendencies on the one hand as well as the possibility of development of novelty on the other.

But already in the same paper series, Peirce famously continues the generalization of the habit concept in the famous exclamation that "... what we call matter is not completely dead, but is merely mind hidebound with habits." ("The Law of Mind", 1892, EP I 331, 6.158). But then

⁷ Add to this idea the actual realization that the sharp distinction between phylogeny and ontogeny holds for higher animals with gendered reproduction only; for bacteria which comprise the vast majority of the biosphere, DNA exchange is not confined to meiosis but takes place continuously even across species so that phylo- and ontogeny are rather aspects of the same process.

physical laws, even pertaining to conservative forces, are *also* habits, only very stiff habits. Similar ontological ideas stabilize after the 1897 adoption of the idea of the objective reality of "real possibilities" or "would-bes", e.g. in the "Minute Logic": "For every habit has, or is, a general law." (1902, 2.148). Thus, a merely physical probability, e.g. that of a die, is now "quite analogous" to human habits, the difference being only one of degrees of simplicity: "... the "would-be" of the die is presumably as much simpler and more definite than the man's habit as the die's homogeneous composition and cubical shape is simpler than the nature of the man's nervous system and soul; and just as it would be necessary, in order to define a man's habit, to describe how it would lead him to behave and upon what sort of occasion--albeit this statement would by no means imply that the habit consists in that action--so to define the die's "would-be," it is necessary to say how it would lead the die to behave on an occasion that would bring out the full consequence of the "would-be"; and this statement will not of itself imply that the "would-be" of the die consists in such behavior." (Notes on "Doctrine of Chances"; 1910, 2.664)

The crude oppositions of habits vs. laws of the period around 1890 thus seems to give way to a more continuous conception according to which natural laws and human habits are but ends of one large generalized continuum of "would-bes", only differing in complexity and plasticity. Thus, we seem to have a habit continuum along the lines of:

*conservative physical laws -> non-conservative physical laws -> innate biological patterns of behavior -> acquired biological patterns of behavior -> deliberately acquired human patterns of behavior -> deliberately acquired human patterns of thought (beliefs)*⁸

with increasing plasticity, and where the former influence the latter but do not determine them fully. Oftentimes, however, more "narrow" habit concepts in Peirce may still be used to single out only later phases of this series. Still, a seminal difference seems to prevail between the physical and the biological phases of the continuum depicted. Biological habits serve a semiotic function because they describe certain possible environmental conditions the actualization of which will release organism action with the local purpose of survival. Purely physical habits hardly could be said to serve such functions (if we do not subscribe to teleological theories of the whole of cosmos). Even if it is possible to render the gravitational pull of an object as a conditional proposition: "Object A is heavy, and if another heavy Object B appears, there will be a gravitational force between them proportional to the product of their masses", this is hardly in itself a quasi-proposition except when appearing in the Umwelt of some organism.⁹

An important idea based on the plasticity increase along the habit continuum above is that of the *variation of habits*, becoming more and more crucial to Peirce. Within biology, this gives rise to the idea that human reason is more plastic than the reasoning of lower animals - making it more prone to error than reasoning in simpler species, but at the same time functioning as a precondition of intellectual growth: "It is a truth well worthy of rumination that all the intellectual development of man rests upon the circumstance that all our action is subject to error. *Errare est humanum* is of all commonplaces the most familiar. Inanimate things do not err at all; and the lower animals very little. Instinct is all but unerring; but reason in all vitally important matters is a

⁸ Of course, "human" should be taken with caution here - we only know human realizations of such processes, but it is in no way precluded that other organisms or automata could satisfy the relevant criteria.

⁹ Following Peirce's definition of a fact: "What we call a 'fact' is something having the structure of a proposition, but supposed to be an element of the very universe itself. The purpose of every sign is to express 'fact,' ..." ("New Elements", 1904, EP II, 304), it is evident that physical laws are general facts and thus have the structure of propositions - but that is not the same thing as saying that they *are* themselves propositions - only their semiotic or scientific representations are.

treacherous guide. This tendency to error, when you put it under the microscope of reflection, is seen to consist of fortuitous variations of our actions in time. But it is apt to escape our attention that on such fortuitous variation our intellect is nourished and grows. For without such fortuitous variation, habit-taking would be impossible; and intellect consists in a plasticity of habit." ("Detached Ideas, Causation and Force", 1898, 6.86) Habit-taking thus considered along Darwinian lines as the combination of variation and selection places an increasing emphasis not only on the initial *establishing* of habits, but also subsequent *variation, selection, development, and changes* of them. This is also connected to an important development in Peirce's logic, namely the sophistication of the concept of deduction which would lead, ultimately, to the important corollarial/theorematic distinction after the turn of the century. A basic idea here is that deduction has been erroneously simplified, generalizing from syllogisms where there is but one deductive conclusion to be inferred – giving the received Kantian impression that there is nothing in the conclusion which was not already clearly there in the premises, and that deduction is thus algorithmically automatizable.¹⁰ But as Peirce realizes, in axiomatic systems, there is nothing like "*the conclusion*": "There is but one conclusion of any consequence to be drawn by ordinary syllogism from given premisses. Hence, it is that we fall into the habit of talking of *the conclusion*. But in the logic of relatives there are conclusions of different orders, depending upon how much iteration takes place. What is the conclusion deducible from the very simple first principles of number? It is ridiculous to speak of *the conclusion*. The conclusion is no less than the aggregate of all the theorems of higher arithmetic that have been discovered or that ever will be discovered." ("Detached Ideas, The First Rule of Logic", 1898, 5.579) Consequently, even deductive inferences imply the need for the variation of inference habits - seeking by trial-and-error the comparison and selection between a variety of different possible proof trajectories. This also considerably complicates the pragmatic core idea that the meaning of a conception is the set of conceivable effects and correlated action habits - for the sum of those effects may, for a given conception, such as "the first principles of number" be far from simple and fully realized only in an idealized future.¹¹

Habit straddling the unconscious/conscious distinction

The most complicated and open issue, however, in Peirce's lifelong habit discussion, concerns the degree to which habits, in the narrower biological and human senses of the word, are subject to awareness, consciousness, deliberation, and self-control. We already saw the idea that beliefs are not habits which are propositions, they are, rather, habit propositions subjected to control. As to belief in particular, Peirce's standard conception was that it is "something that we are aware of" as we saw in "How to Make our Ideas Clear" (1878). This, however, is subject to many qualifications and even contradictions. This seems to have to do with the Scotist roots of Peirce's conception of habit. In his

¹⁰ As was the case as late as in 1878 when Peirce wrote: "As for deduction, which adds nothing to the premisses, but only out of the various facts represented in the premisses selects one and brings the attention down to it, this may be considered as the logical formula for paying attention, which is the volitional element of thought, and corresponds to nervous discharge in the sphere of physiology." ("Deduction, Induction, and Hypothesis", 1878, 2.643)

¹¹ Of course, this is equivalent to Hilbert's *Entscheidungs*-problem, which was, famously, proved undecidable by Gödel thirty years later. The implication of this for pragmatism is that for certain conceptions, not only the sum of conceivable effects may be practically unattainable but in some cases not even *principally* attainable. Consequently, the same holds for the related action habits. In most cases, however, this makes the concept of number no less pragmatically clear.

famous early articulation of his "scholastic realism", Peirce wrote in 1871, addressing Scotus' solution to the problem of universals:

"... it may be asked, first, is it necessary to its [the universal's] existence that it should be in the mind; and, second, does it exist in re? There are two ways in which a thing may be in the mind, -- *habitualiter* and *actualiter*. A notion is in the mind *actualiter* when it is actually conceived; it is in the mind *habitualiter* when it can directly produce a conception. It is by virtue of mental association (we moderns should say), that things are in the mind *habitualiter*. In the Aristotelian philosophy, the intellect is regarded as being to the soul what the eye is to the body. The mind *perceives* likenesses and other relations in the objects of sense, and thus just as sense affords sensible images of things, so the intellect affords intelligible images of them. It is as such a *species intelligibilis* that Scotus supposes that a conception exists which is in the mind *habitualiter*, not *actualiter*." (Review of Fraser's Works of Berkeley, 1871, EP I, 92, 8.18).

Thus, Peirce's conception of how a habit inhabits the mind is derived from the Scotist theory of universals: the habit simply *is* the way that a universal is in the mind, for the universal, just like its counterpart in reality, is not exhausted by any actual occurrence in the mind of conscious tokens of it.¹² So it forms part of the mind's structure, also when it is not present to the mind. But this implies the surprising consequence that this habitual existence does *not* depend upon consciousness: "This *species* is in the mind, in the sense of being the immediate object of knowledge, but its existence in the mind is independent of *consciousness*." (ibid.) This holds important consequences for Peirce's realism, but also for our actual interest in the mode of existence of habits in the mind: "... to say that an object is in the mind is only a metaphorical way of saying that it stands to the intellect in the relation of known to knower." (ibid.) But as the existence of habits is independent of consciousness, this knowledge of habits must be but unconscious or potential. Already in 1867, Peirce had insisted on the threefold character of Scotus' distinction: "I adopt the admirable distinction of Scotus between actual, habitual, and virtual cognition." (2.398 fn). The virtual cognition comprises the whole universe of possible forms which the mind may possibly address; an example lies in the fact discussed above that certain implications in the ultimate meaning of a conception may be logically possible but never reached, neither actually nor by the (use of the) existing habits concerning the meaning "... I do not think that the import of any word (except perhaps a pronoun) is limited to what is in the utterer's mind actualiter, so that when I mention the Greek language my meaning should be limited to such Greek words as I happen to be thinking of at the moment. It is, on the contrary, according to me, what is in the mind, perhaps not even habitualiter, but only virtualiter, which constitutes the import. To say that I hold that the import, or adequate ultimate interpretation, of a concept is contained, not in any deed or deeds that will ever be done, but in a habit of conduct, or general moral determination of whatever procedure there may come to be, is no more than to say that I am a pragmatist." ("Consequences of critical Common-Sensism", 1905, 5.504). *Actualiter* are the Greek words or sentences I may be processing in any moment; *habitualiter* is my general knowledge of Greek and *virtualiter* is the whole of the Greek language, including those parts I never learnt.

So, the Scotist distinction between *virtualiter*, *actualiter*, and *habitualiter* cognition - to resume the three in the order of Peirce's categories - may be explained using, again, the logical example of inference from habit: *Habitualiter*: an empirical thought habit may be: "If it lightens,

¹² "The Scotistic form or essence functions in precisely the same manner that Peirce's habit does; it determines how a thing "would be" disposed to behave under certain specifiable conditions." (Raposa 1984, 157)

then it thunders" *Actualiter*: Any existing occurrence of "lightening" to the mind is an actual cognition. *Virtualiter*: the combination of the two *may* lead to the conclusion: "it thunders". But even if the mind in question holds the habit mentioned and actually has the experience cited, there is no guarantee that the relevant conclusion will be drawn - it thus may remain virtual. In the pragmatic maxim meaning definition, we may surmise that many among the sum of the conceivable effects of a given conception will, at any point of time, remain virtual only. And to say that virtual cognitions, even if logically implied by a presently conscious cognition, are in any sense "in the mind", may be to stretch the point beyond normal usage - which may be why Peirce sometimes mentions two out of the Scotist trichotomy only.

Actual cognitions are thus taken to be conscious, at least in general, while virtual cognitions are not. Habitual cognitions are more than their actual, conscious instantiations and thus have an unconscious basis - but they may, on the other hand, become conscious as objects of deliberate consideration. Thus, as to the definition of belief as a thought-habit, Peirce is bewilderingly inconsequent as to its deliberate, conscious, self-controlled character - which seemed clear in the 1878 pragmatic maxim version. Suffice it to compare the following later quotes:

"A belief is a habit; but it is a habit of which we are conscious. The actual calling to mind of the substance of a belief, not as personal to ourselves, but as holding good, or true, is a judgment. An inference is a passage from one belief to another; but not every such passage is an inference." ("How to Reason, Essence of Reasoning, Chapter 6", 1893, 4.53)

"A belief need not be conscious. When it is recognized, the act of recognition is called by logicians a judgment, although this is properly a term of psychology. A man may become aware of any habit, and may describe to himself the general way in which it will act. For every habit has, or is, a general law. (...) What particularly distinguishes a general belief, or opinion, such as is an inferential conclusion, from other habits, is that it is active in the imagination. (...) ... a belief habit formed in the imagination simply, as when I consider how I ought to act under imaginary circumstances, will equally affect my real action should those circumstances be realized." (*Minute Logic*, 1902 2.148)

"The purpose of reasoning is to proceed from the recognition of the truth we already know to the knowledge of novel truth. This we may do by instinct or by a habit of which we are hardly conscious. But the operation is not worthy to be called reasoning unless it be deliberate, critical, self-controlled. In such genuine reasoning we are always conscious of proceeding according to a general rule which we approve. It may not be precisely formulated, but still we do think that all reasoning of that perhaps rather vaguely characterized kind will be safe. This is a doctrine of logic. We never can really reason without entertaining a logical theory. That is called our *logica utens*." ("Logical Tracts no. 2", 1903, 4.476.)

"Belief is not a momentary mode of consciousness; it is a habit of mind essentially enduring for some time, and mostly (at least) unconscious; and like other habits, it is (until it meets with some surprise that begins its dissolution) perfectly self-satisfied. (...) a process of self-preparation will tend to impart to action (when the occasion for it shall arise), one fixed character, which is indicated and perhaps roughly measured by the absence (or slightness) of the feeling of self-reproach, which subsequent reflection will induce. Now, this subsequent reflection is part of the self-preparation for action on the next occasion. Consequently, there is a tendency, as action is repeated again and again, for the action to approximate indefinitely toward the perfection of that fixed character, which would be marked by entire

absence of self-reproach. The more closely this is approached, the less room for self-control there will be; and where no self-control is possible there will be no self-reproach." ("What Pragmatism Is" 1905, 5.417)

"... habit is by no means exclusively a mental fact. Empirically, we find that some plants take habits. The stream of water that wears a bed for itself is forming a habit. Every ditcher so thinks of it. Turning to the rational side of the question, the excellent current definition of habit, due, I suppose, to some physiologist (if I can remember my by-reading for nearly half a century unglanced at, Brown-Sequard much insisted on it in his book on the spinal cord), says not one word about the mind. Why should it, when habits in themselves are entirely unconscious, though feelings may be symptoms of them, and when consciousness alone -- i.e., feeling -- is the only distinctive attribute of mind?" ("Pragmatism", Ms 318, 1907, EPII 418, 5.492)

The chronological organization of these quotes may give the idea that the emphasis on the basically unconscious status of habits - including beliefs - is growing over Peirce's mature period. There are, however, also counterexamples during that period ("[Readiness] to act in a certain way under given circumstances and when actuated by a given motive is a habit; and a deliberate, or self-controlled, habit is precisely a belief.", "Pragmatism", Ms. 318, 1907, 5.480), but the tendency goes in the direction of the doctrine that habits as well as beliefs are basically unconscious, even if they give rise to conscious feelings when instantiated. Habits themselves may, however, become the object of consciousness - as in the important case of the deliberate adoption of habits, in thought as in action. Adoption of habits may take place inductively, the habit being established by the repetition of similar acts, which are not necessarily deliberate and conscious - or, it may take place by deliberate, conscious, imaginative experimentation in the mind, ensued by deliberate decision, akin to the addressing an order to the future self which is, necessarily conscious ("Pragmatism", Ms. 318, 1907, EP II, 413, CP 5.487). Only the latter, the deliberate and conscious inference of one proposition from another, qualifies as *reasoning*, as Peirce repeatedly insists. The automatized drawing of inferences in a mechanical logic machine, however refined, will never be but quasi-inferences because they lack the quality of deliberate, conscious self-control. Thus, the very role of consciousness in mind, is to make possible that increased level of self-control which characterizes real reasoning: "... I am far from holding consciousness to be an "epiphenomenon", though the doctrine that it is so has aided the development of science. To my apprehension, the function of consciousness is to render self-control possible and efficient", (Ms. 318, 1907, 74-76). But human beings do lots of things which are not characterized by deliberate, conscious self-control. To repeat the nested series of processes from the above section:

conservative physical laws -> non-conservative physical laws -> innate biological patterns of behavior -> acquired biological patterns of behavior -> deliberately acquired human patterns of behavior -> deliberately acquired human patterns of thought (beliefs)

- human beings, of course, partake in all of them, and only the latter small subset qualify as reasonings. This would explain Peirce's seeming vacillation as to the conscious status of habits and beliefs: the crucial subset of reasonings require conscious deliberation but human beings constantly acquire, follow, and change many habits and beliefs without that underpinning by explicit reasoning.

Peirce's criterion for reasoning, that it is the subject of deliberate, conscious self-control, is only really developed from around 1902 ("Minute Logic"), figuring centrally in the 1903

Pragmatism lectures and the last *Monist* papers series. In 1905, Peirce dates, a bit hesitant, the appearance of the idea of ethical constraints on logic, based on the self-control criterion of reasoning, as late as to the 1903 Lowell Lectures ("Consequences of critical Common-Sensism", 1905, 5.533), and it certainly takes center stage only from around 1902. The discussions around that criterion opens a bundle of questions which we shall approach as a conclusion:

- 1) what is the relation between consciousness and self-control? - the former as a special tool serving the latter
- 2) how is self-control developed? - cf. the hierarchy of self-controls
- 3) what is the relation between self-control more generally and self-control of logical thought in particular?
- 4) what is the status of the final action habit claimed by the pragmatic maxim as the ultimate meaning of conceptions?

Self-control and consciousness

We saw how Peirce's mature theory of consciousness simply makes it a tool for efficient-self-control. Self-control thus is a wider phenomenon which has consciousness as one of its higher-level instruments. Connected to this is the realization that conscious control can only encompass certain highlighted steps of inference, never all of their preconditions all the way to the bottom. Consciousness, as a mark of deliberate reasoning, could never require full perspicuity as to all levels, preconditions and implications of reasoning. This is indicated, of course, by the *logica utens/logica docens* distinction: only the scientific logician makes of logic an explicit doctrine; the normal reasoner, including scientists and mathematicians, makes do with his *logica utens* which not necessarily includes access to the explicit formulation of logical rules and principles. So deliberate, conscious self-criticism is taken to be possible with less than *logica docens*. Thus, reasoning normally makes do with a triple fundament of "perceptual judgments, original (i.e., indubitable because uncriticized) beliefs of a general and recurrent kind, as well as indubitable acritical inferences." ("Issues of Pragmaticism", EP II, 348) – none of them subject to conscious self-control. The two latter are only in the mind *habitualiter* – that is, not necessarily in the conscious present, and the former, perceptual judgments, appear in the mind unconditionally, beyond criticism and must be taken at face value (of course, certain perceptual judgments may be criticized, but only on the basis of other such judgments which then lie beyond conscious control):

"... to say that an operation of the mind is controlled is to say that it is, in a special sense, a conscious operation; and this no doubt is the consciousness of reasoning. For this theory requires that in reasoning we should be conscious, not only of the conclusion, and of our deliberate approval of it, but also of its being the result of the premiss from which it does result, and furthermore that the inference is one of a possible class of inferences which conform to one guiding principle. Now in fact we find a well-marked class of mental operations, clearly of a different nature from any others which do possess just these properties. They alone deserve to be called reasonings; and if the reasoner is conscious, even vaguely, of what his guiding principle is, his reasoning should be called a logical argumentation. There are, however, cases in which we are conscious that a belief has been determined by another given belief, but are not conscious that it proceeds on any general principle. Such is St. Augustine's "cogito, ergo sum." Such a process should be called, not a reasoning, but an acritical inference. Again, there are cases in which one belief is determined by another, without our being at all aware of it. These should be called *associational suggestions of belief*." (Issues of Pragmaticism 1905, CP 5.441)

So there are vast amounts of inference habits which are not subjected to conscious control (but may, of course, later be so subjected) and thus not proper logical reasoning, and even within such reasoning, the guiding principle may be the subject of vague acceptance only. Peirce obviously does not want normal scientists, e.g., with little or no acquaintance with explicit formal logic, to be bereft of reasoning abilities, so he admits sufficient conscious control to remain vague only.

On the other hand, self-control is a far wider subject than pertaining to logical inference habits only - it potentially addresses all other types habits, particularly moral habits of which logic is taken to be a special example only:

"... while I hold all logical, or intellectual, interpretants to be habits, I by no means say that all habits are such interpretants. It is only self-controlled habits that are so, and not all of them, either." ("Pragmatism", Ms 318, 1907, EPII 431)

Thus, logical reasoning is but a subtype of the last category of the continuum above:

deliberately acquired human patterns of thought (beliefs)-> logical reasonings

It comes as no surprise that the structure of deliberately establishing new habits by means of logical reasoning in the broad sense is co-extensive with scientific epistemology:

" In the process of inference, or the self-controlled formation of new belief on the basis of Knowledge already possessed, I remark three chief steps. They are, first, the putting together of facts which it had not occurred to us to consider in their bearings upon one another, second, experimentation, observation, and experimental analysis, which is substantially the same process whether it be performed with physical apparatus such as the chemist uses or with an apparatus of diagrams of our own creation, such as the mathematician employs, and third, the generalization of experimental results, that is, the recognition of the general conditions governing the experiment, and the formation of a habit of thought under the influence of it." (7.276 n.d. but late - P speaks about having studied logic for 40 years)

Hierarchies of self-control

Thus self-control is a far wider subject than consciousness and is assumed to be under development already in biology, and the relevant self needs not be a single organism, rather, the ongoing adaptation of a lineage to its environment after Darwinist principles should probably be classed as an early degree of self-control. Growth in self control is not, however, taken to be a gradual increase of the same capability, rather taking the shape of iteration of controls over controls, habits controlling other habits (see also Shapiro 1973, 38; Stjernfelt 2014 ch. 6), constructing a hierarchy of nested habit controls:

"To return to self-control, (...) of course there are inhibitions and coördinations that entirely escape consciousness. There are, in the next place, modes of self-control which seem quite instinctive. Next, there is a kind of self-control which results from training. Next, a man can be his own training-master and thus control his self-control. When this point is reached much or all the training may be conducted in imagination. When a man trains himself, thus controlling control, he must have some moral rule in view, however special and irrational it may be. But next he may undertake

to improve this rule; that is, to exercise a control over his control of control. To do this he must have in view something higher than an irrational rule. He must have some sort of moral principle. This, in turn, may be controlled by reference to an esthetic ideal of what is fine. There are certainly more grades than I have enumerated. Perhaps their number is indefinite. The brutes are certainly capable of more than one grade of control; but it seems to me that our superiority to them is more due to our greater number of grades of self-control than it is to our versatility."

Self-control, thus is a hierarchy ultimately aiming at some esthetic norm (in Peirce's very broad sense of esthetics as that which charts all purposes valuable of pursuit): "... it is by the indefinite replication of self-control upon self-control that the *vir* is begotten, ..." ("Consequences of Pragmaticism," 1906, 5.402fn) In human beings, a particular device is deemed central, namely that of hypostatic abstraction, of making a subject of thought out of something which has already been thought:

"... thinking is a kind of conduct, and is itself controllable, as everybody knows. Now the intellectual control of thinking takes place by thinking about thought. (...) One extremely important grade of thinking about thought, which my logical analyses have shown to be one of chief, if not the chief, explanation of the power of mathematical reasoning (...) This operation is performed when something, that one has thought about any subject, is itself made a subject of thought." ("Consequences of critical Common-Sensism", 1905, 5.533)

This process, of course, may be iterated, so thinking about thinking of thought, etc. gives rise to a number of habit levels which simultaneously constitute what is referred to as human freedom:

"... a man is a machine with automatic controls, one over another, for five or six grades, at least. I, for my part, am very dubious as to man's having more freedom than that, nor do I see what pragmatic meaning there is in saying that he has more. The power of self-control is certainly not a power over what one is doing at the very instant the operation of self-control is commenced. It consists (to mention only the leading constituents) first, in comparing one's past deeds with standards, second, in rational deliberation concerning how one will act in the future, in itself a highly complicated operation, third, in the formation of a resolve, fourth, in the creation, on the basis of the resolve, of a strong determination, or modification of habit. This operation of self-control is a process in which logical sequence is converted into mechanical sequence or something of the sort." (8.320, letter to Schiller, probably 1906)

The final resolve - typically, again expressed in a conditional proposition with the intention of regulating future behaviour - is converted into a mechanical procedure so as to ease future use and avoid repeating the complicated reasoning process over and over again at each potential occasion. Thus, the idea of the "deliberate, conscious" quality of reasoning is fleshed out in two doctrines: a) that of a hierarchy of self-controls, taking their beginnings deep in biology b) that of the higher levels of such controls taking the shape of thinking about thought, using the semiotic tool of hypostatic abstraction, permitting a higher level of thought to control the next lower level.

The status of the final action habit - a proposition or not?

Even if an explicit conclusion in the shape of a conscious, deliberately assented proposition is one type only among self-controlled habits, it takes a special position in Peirce because being the condition for science and thus subject to logical and epistemological investigation. But here a

particular conundrum appears. The pragmatic maxim, in its different guises, identifies the final meaning of any conception with the bundle of action habits which the truth of that conception would ultimately give rise to. But is that set of action habits, in itself, a sign? Peirce tends to answer "no". Being a fact, of course, such an action habit will still possess the structure of a proposition, but it will not, in itself, be a sign. The idea seems to be that ever so long chains, hierarchies, and diagrams of logical inferences serve, in the last resort, the arc taking us from perceptual judgment to action, two ends not in themselves logical.

"In every case, after some preliminaries, the activity takes the form of experimentation in the inner world; and the conclusion (if it comes to a definite conclusion), is that under given conditions, the interpreter will have formed the habit of acting in a given way whenever he may desire a given kind of result. The real and living logical conclusion is that habit; the verbal formulation merely expresses it. I do not deny that a concept, proposition, or argument may be a logical interpretant. I only insist that it cannot be the final logical interpretant, for the reason that it is itself a sign of that very kind that has itself a logical interpretant. The habit alone, which though it may be a sign in some other way, is not a sign in that way in which that sign of which it is the logical interpretant is the sign. The habit conjoined with the motive and the conditions has the action for its energetic interpretant; but action cannot be a logical interpretant, because it lacks generality. The concept which is a logical interpretant is only imperfectly so. It somewhat partakes of the nature of a verbal definition, and is as inferior to the habit, and much in the same way, as a verbal definition is inferior to the real definition. The deliberately formed, self-analyzing habit -- self-analyzing because formed by the aid of analysis of the exercises that nourished it -- is the living definition, the veritable and final logical interpretant. Consequently, the most perfect account of a concept that words can convey will consist in a description of the habit which that concept is calculated to produce. But how otherwise can a habit be described than by a description of the kind of action to which it gives rise, with the specification of the conditions and of the motive?" ("Pragmatism" 1907, EP II 418, 5.491)

But, as Hookway says (2009, 26-27): the very verbal description of the habit implied by the pragmatic maxim is, in itself, conceptual and thus a sort of further logical interpretant of it - in that sense the action habit could not be the final logical interpretant. The same tension is present in the Peirce quote just given: the central argument that "action cannot be a logic interpretant, because it lacks generality." The conclusion of the habit inference, however, as discussed above, is no single action event. It is a general structure surpassing any number of such events. And that is exactly what the end of the quote addresses: the *kind* of action. Action is the dynamic interpretant, the conception of action is the logical interpretant. So it must be in another sense that the action habit is the final logical interpretant. The issue is not made simpler, obviously, by the fact that those ultimate action habits defining meaning also comprise cognitive action habits. Pietarinen and Bellucci (in prep., 12) rightly argue that in the special but central case of the leading principle of an inference, the explicit expression of that (taking it from *logica utens* to *docens*, so to speak) is, in a certain sense superfluous: "To regard a habit as a sign is analogous to regard the leading principle of reasoning as a premise of reasoning: by some sort of deduction theorem one can always express the leading principle (logical rule) as a conditional proposition (logical proposition), but as he had shown already in 1867, nothing is gained by so doing when the leading principle is *logical*, for the very same principle will be governing the new argument thereby obtained. In semeiotical terms, in reasoning no final logical interpretant can be considered as a sign without employing in this reasoning that very same logical interpretant." This might give us the clue also to the final logical

interpretant of thought signs in general.¹³ The finality of the set of action habits should rather be seen from the perspective that they furnish the final arbiter of truth of the proposition of which they serve as interpretants. If any of those habits fail in some respect, it will be a sign there is something to be checked about the relevant proposition.

Habits and Dicisigns revisited

This long development finally paves the way for our conclusion as to the relation between habits and propositions. Habits, in general, are articulated with the structure of conditional propositions - this includes even non-biological, conservative physical laws. This does not make them propositions - cf. Peirce's definition of fact as a part of reality having the structure of a proposition (but not in itself *being* a proposition). As to the biological/human habit types of innate habits, acquired habits (specifications of more general innate habits), deliberately acquired habits, etc. they will also be structured as conditional propositions. Animal and human behaviours, on this analysis, have propositional structure, and a significant part of them, whether conscious or not, qualify as beliefs - the decisive criterion here being whether they articulate the double habit structure so that they themselves constitute rule-bound signs, in turn, referring to other rule-bound habits in their objects.

This result probably, from the point of view of the parsimonious ontologist, gives us a vastly overpopulated universe. Why couldn't we just do with individual objects, while human minds take care of the analyses of those objects in terms of similarities, habits, laws, signs, propositions, inferences, etc.? The basic reason is that such a universe is ineradicably dualist, and what is more, strange. Throwing most of the complexity of the cosmos into the human mind, leaving only individuals out there, gives us two radically different and incommensurable parts of that cosmos, that is, the human mind and the rest. This makes it difficult to envisage how the human mind could ever have evolved out of that naked universe. Thus, Peirce's conception is deep down motivated by his naturalist monism. As to habits, it is monism that make him construct the chain of being connecting regularities, spanning from conservative physical laws in one end and conscious human habit-taking in the other. As to propositions, it is monism that takes us from facts - structured like propositions - in the one end to fully-fledged, deliberately adopted, explicitly expressed proposition signs in the other end. So, the basic motivation is naturalism. Thus, Peirce may serve as a possible inspiration for actual naturalism attempts, reminding us that naturalism may not necessarily give us a very simple ontology, rather the opposite. But why should it not? Chemistry progressed only when it realized that the number of elements exceeded four.

Thanks to Francesco Bellucci for comments and discussions

¹³ But probably not more than a clue - the generalization to the non-sign, action habit character of the final interpretants of *all* concepts is probably equivalent to the much sought-for "proof of pragmatism".

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