



Virtuality



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Abstract:

Over the past five centuries the word *virtuality* (*virtuallyte*, *virtualitas*) has been used to denote a power, a potentiality, and an embodiment or essence as a certain kind of substituted greater-or-lesser reality. The Holy Spirit was supposed to be some sort of differentiated power or force. Sir William Hamilton regarded a condition of virtuality as an unperfected reality. Hegel characterized space as *Ansichsein* (Being-in-itself), as "only abstract subsistence or virtual being." And Heidegger characterized all of history as a kind of virtuality.

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Throughout his life Peirce was interested in the concept of virtuality, finding a place for it in his metaphysics, theory of categories, theory of signs, and pragmatism. He defined for Baldwin's *Dictionary of Philosophy and Psychology* the "proper meaning" of *virtual*: "A virtual X (where X is a common noun) is something, not an X, which has the efficiency (*virtus*) of an X" (CP 6.372). A virtual X is not a potential X because a potential X is "without actual efficiency." However, a virtual X is a potential X in a universe that empowers potential Xs to become actual Xs. Without such empowerment it is merely potential in an abstract and less philosophically interesting sense. So, to speak of virtuality in Peirce's sense is to be concerned with certain very fundamental metaphysical properties about the universe at large and not exclusively with the world of human constructs and conventions.

This perspective emerges in Peirce's reference to Scotus in his definition of *virtual*: "Virtual knowledge: a term of Scotus defined by him (*Opus Oxon.*, Pt. I. iii. 3)" (CP 6.372). In *Cognito Naturalis De Deo* ("Man's Natural Knowledge of God"), Scotus writes: "No object will produce a simple and proper concept of itself and a simple and proper concept of another object unless it contains this second object essentially or virtually" (Wolter translation, p. 23). When we perceive a sphere we necessarily also perceive a circle. To Scotus' way of thinking, the mind has no choice, because it is under the influence of an intelligible being (sphere) that contains a virtual being (circle) with the power to thrust itself upon the mind and be recognized for the essential nature it is. The mind does not create or imagine either sphere or circle; nor does it create color when it sees red. It does not engage in an association of ideas or mental impressions according to Scotus, but is influenced by the living action of concepts, intelligible beings, which are themselves only made possible in a universe created by God. In the context of

scholastic realism virtuality is a component in the process of reasoning. Reasoning occurs as a linking process because every thought contains an actual and virtual dimension, the virtual dimension serving as a vehicle or link to further actualization of thought.

In his Harvard Lectures, 1869-1870, Peirce called Scotus and Ockham "the greatest speculative minds of the middle ages, as well as two of the profoundest metaphysicians that ever lived" (W 2: 311). He should have included Thomas of Erfurt, whose *Grammatica Speculativa* was attributed to Scotus in the nineteenth-century. In that work Erfurt explained signification as a result of an essential dual nature in thought that always involves an active and passive dimension, something that acts and its acted upon in the same process or event: "The active mode of signifying is the mode or property of the expression vouchsafed by the intellect to itself by means of which the expression signifies the property of the *thing*. The passive mode of signifying is the mode or property of the thing as signified by the expression" (W 2: 322). The active and passive modes is shown but not explained in the linguistic dichotomy: to sign and a sign. But Thomas seeks a deeper explanation that doubtless is a source of Peirce's admiration. The active and passive mode of signifying derive from the active and passive mode of the understanding itself. When we notice that the intellect can signify in its active mode we are regarding the active mode of signifying in a passive mode, otherwise we could never identify the signifying process to begin with. This is the work of the passive, phenomenological, intellect. The active mode of understanding is "the faculty of conceptualizing by means of which the intellect signifies, conceives or comprehends the properties of the thing" (W 2: 324). The passive mode of understanding is "the property of the thing as comprehended by the mind." So it seems that signification is at the very heart of thinking as Thomas explains it.

Thomas continues by discussing the differences and similarities between the modes of being, understanding, and signifying. Although things, thoughts, and signs (expressions) differ materially, they are formally similar in that each may be regarded as *properties of*, respectively, reality, reflection, and signifying. The three are also linked when regarded are effects of final causation. Peirce understood final causality I mean 'the influence of the future upon the past' (CP 6.66 and 8.128). Signifying, for Thomas, manifests final causality:

The active mode of signifying, since it may be a property of the significative expression, is materially existent within the significative expression even as it is empirically valable [*ut in subiecto*]; moreover, it is materially existent in the property of the thing even as some effect is

materially existent in the original and abstract cause which effects it in the first place; and it is materially existent in the intellect even as an effect is materially existent in the most immediate cause that effects it; and it is materially existent in the construction [*constructione*], even as a cause capable of being effective is materially existent in its own particular effect (W 2, p. 326).

Thus, the active mode of signifying, i.e., the act of signifying something in terms of something else, is capable of being itself a significative *expression* of active signifying, e.g., as in the concept and phrase 'the active mode of signifying', and is not only 'materially existent' in the signifying process but causes it, as if, in case of signifying, thinking results from thought and not vice versa; as if the signified causes the object it signifies to produce a sign of itself. The same is true for what is in the intellect as a 'construction' just "as a cause capable of being effective is materially existent in its own particular effect." The usual model the Schoolmen had in mind for this kind of process is germinal growth. Final causes involve developmental processes. As applied to semiosis and its conditions, final causation means, first, that signs are always expressions with an indeterminate dimension and contains the power or efficacy to refer to other signs. Second, signs reverse causation by influencing the factors which bring them about. It is as if the general or abstract form (Thomas's "abstract cause,") of the music Mozart created produced Mozart's musical mind so that he could produce such music in specific forms. The music, which is specifically connected, as a material cause, to the specific physical processes of the instruments that produce it for the composer, may be manifested in a variety of other forms as expressions of virtual reality.

Scotus and Thomas of Erfurt, of course, were not alone in linking signification and virtuality. Thomas Aquinas spoke of "the virtuality of the cognitive and the affective powers" of the soul, (*Disputed Questions on Truth* Vol 3 Q 24 A 5 Obj 4 p 157), referring to the origination power to throw off significations which acquire a less than perfect life of their own and not the highest degree of life divine perfection could produce. John of St Thomas referred to signs as servants whose master had died, still capable of carrying out their duties "through the virtuality or efficacy [he] leaves behind" (Poinso: *Tractatus de Signis* Book I, Question 1: TDS 126/1-22).

From his reading of the Schoolmen, Peirce was able to analyze virtuality in terms of a power to act in a formal, non-material way, as if an action at a distance, that produces a being-for-something-else, an associated entity which becomes the basis for thought. The paradigmatic but not exclusive form of virtuality is thinking which automatically generates real/virtual pairs in the same spontaneous active/passive process. In his metaphysical writings he distinguished the virtual from the actual and both the former

from the real. I think he believed that there is a sense in which these three 'worlds' differed by an algorithmic degree and it was the task of the metaphysician to identify, describe, and explain—as far as is possible in any given stage of inquiry—the modes of connectedness between the three worlds. Generally, Peirce used virtual and its related forms in ways that required explanation in terms of his metaphysical ideas and theories. For example, he contrasts actuality (*actualiter*), habituality (*habitualiter*), and virtuality (*virtualiter*) (CP 5.504) as three mental capacities: the capacity of a particular mind to contemplate particular and specific objects, the capacity of a particular mind to have a tendency think about certain objects in particular contexts based upon the actual experiences of that particular mind, and the capacity of a particular mind to reason. He writes: "... 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." The indeterminacy of signification noted by the Schoolmen became a component in Peirce's pragmatic theory of meaning and truth.

Instinct also has a virtual dimension for Peirce: "The instincts connected with the need of nutrition have furnished all animals with some virtual knowledge of space and of force, and made them applied physicists. The instincts connected with sexual reproduction have furnished all animals at all like ourselves with some virtual comprehension of the minds of other animals of their kind, so that they are applied psychists." (CP 5.586) Again, virtuality in the sense used here is not a mere potentiality, nor a kind if being, but a capacity to act without reasoning as if reasoning had occurred.

Peirce also employed the concept of virtuality to connect instinct, abduction, semiosis, and pragmatism, since - "No present actual thought (which is mere feeling) has any meaning, any intellectual value; for this lies, not in what is actually thought, but in what the thought may be connected with in representation by subsequent thoughts; so that the meaning of a thought is altogether something virtual" (CP 5.289). And: "...perception attains a virtual judgment, it subsumes something under a class, and not only so, but virtually attaches to the proposition the seal of assent ..." (CP 8.66) Virtual states, for Peirce, are generated at every phase of life, wherein Thirdness rules. They

comprise a linked duality, and so also a triadicity. In an essay, "On Reality," (MS 198, 1872; W 3: 39) he argues that "the present means nothing except so far as it appeals to the future." This is because there are no entirely present feelings, but only feelings which invariably contain "something virtually present in the consciousness just before." And the something just before refers to the feeling connected to it, which on certain occasions may allow us to say it has meaning. Peirce continues: "Thus, a certain complication of feelings may give rise to a feeling which is a sign of that particular complication. Now this complication was not actually felt except by this very feeling, nor perhaps even then very clearly, yet it is sufficient that there is held to be some element in the preexisting state of feeling which the feeling indicates to make this feeling mean that." This kind of linking occurs without control, as if automatically, and gives us a rudimentary sense of 'reality,' which upon reflection hardly seems real at all. Yet, "the strangeness of this fact disappears entirely when we adopt the conception of external realities. We say that the observations on the result of the action upon the mind of outward things, and that their diversity is due to the diversity of our relations to these things" (W 3: 44). But, if we reflect upon it we must recognize mentality to be "an extraordinary exception to the ordinary laws of mechanics." (W 3: 45). A sign, then, in its simplest form may be regarded as the by-product of the "complication" of the simultaneous emergence of actual and virtual feelings. Peirce gives a modern spin to the question posed by Scotus: "Can any certain and unadulterated truth be known naturally by the intellect of a person in this life without the special illumination of the Uncreated Light?" (Scotus 1962: 97). Without resorting to theism, Peirce describes the certain and unadulterated truth to be that there are no unconnected mental events and further that for any given mental event there is another that belongs to it as if it were specially illuminated by it. In his own words Peirce posed the question as: "Whether by the simple contemplation of a cognition, independently of any previous knowledge and without reasoning from signs, we are enabled rightly to judge whether that cognition has been determined by a previous cognition or whether it refers immediately to its object" (W 2: 193). Instead of postulating a virtual world inhabited by spiritual beings, who lack materiality and spatio-temporal determination, Peirce locates virtuality within the world of our knowledge and experience, secularizing—at least at this point in his career—the concept altogether.

Peirce's remarks on virtuality in relation to knowledge, semiosis, and the Schoolmen provide an incentive to identify virtual phenomena in the natural sciences. Virtuality is a process of nature and the question *What is virtuality?* requires a scientific answer. In *Baldwin's Dictionary* he refers to one such use of virtuality in physics (statics), the

notion of virtual velocity: "A virtual velocity is something not a velocity, but a displacement; but equivalent to a velocity in the formula, 'what is gained in velocity is lost in power'." (CP 6.372). A virtual displacement, reflecting the result of virtual work, is a hypothetical displacement of a system that is held in equilibrium but is conceived to move infinitesimally along a line of force. Particle physicists refer to the virtual particles that match up with real particles, particles that are sometimes defined as virtual because they "cannot be observed directly, but their indirect effects can be measured." (Hawking, 2001: 118). But that by itself is a rather uninteresting sort of virtuality, merely based upon the potency of our linear accelerators, the refinement of our instruments of measurements, and the concepts and theories we use to interpret the results of our experiments. If there is a real supersymmetry in the universe every known particle would have an unknown annihilating partner regardless of whether minds evolved to discover this fact. Real virtuality would be a condition that exists even in a universe without physicists. In Peircean terms the particle and its 'antimatter' virtual particle would constitute an instance of Thirdness because they were paired with a certain efficacy and not merely associated either by an external force or by a mind that associates them as a pair without a relation between themselves. That efficacy which rises to the level of Thirdness is found in the characteristics of their interaction: they retain their identity as members of a pair even if they are separated and 'know' that they have found their mate among other seemingly indistinguishable members of their clan (useful in the budding science of nano-computing and encryption) and they lose their identity and individuality when they are superimposed. Peirce, at one point, described Firstness as "virtual variety" because it is "full of life and variety." Variety cannot be explained by non-variety (e.g. homogenous ultimate particles) (CP 1.373). So it may be fruitful to suppose that virtuality is an essential character of the universe.

Some forms of virtuality, like language as a form of expression and communication, like the action of the world wide web or the buzzing symbolic universe of the computer terminal screen are clearly the result of the actions of mentality. So is the mathematical interpretation of virtual velocity. However, Peirce's link of virtuality and semiosis, and his trans-human notion of mentality, appears to require that non-mental virtuality be a condition for the possibility for the virtuality in the human world. The person sitting terrified in the darkness of the movie house cannot be possible unless imagery neurons are making representations, and virtual subatomic particles are dancing with their virtual partners in some sort of systematic pattern. Instances of 'atomic virtuality' must occur before and in order for higher-order virtual systems to be possible. A single Cobalt atom at very low temperatures has been made to 'project' or 'reproduce' or 'duplicate'-

each of these terms implies its own troublesome ontology— its electronic structure to a certain location at a distance forming a “quantum mirage” of itself. (Manoharan et al 2000). Neurological measurements attempting to distinguish the difference in the neurons of the brain between perception and imagination reveal that there is a “common substrate for the processing of incoming visual information and visual recall.” (Kreiman et al 2000). It turns out that the difference between what is real and what is virtual is not a difference in the way the brain operates; there is an considerable similarity between the processes for each. The materialist interprets the results of both experiments as evidence that the basis of the virtual is material. By contrast Peirce would say that the material has a capability of taking on virtual properties.

The metaphysical research program Peirce proposed follows the maxim: *Always look for continuities*. Thus, the image that is recalled in the human brain may share a common substrate with the process that creates an atomic mirage. The various conceptions of virtuality are important tools in that endeavor. They comprise “a centerpiece of [Peirce’s] semiotic doctrine of mind, knowledge, and language” (Skagestad, “Peirce, Virtuality, and Semiotic”). A general theory of virtuality may also be a useful theoretical project. We should keep in mind the link between virtuality and Thirdness and use Peirce’s remarks about the latter to shed light on the former. A swinging pendulum is an example of a virtual system because of the regularity of its movement. We are able to say that it is virtually present at all points in which it is not actually present; however, its virtuality is of a low-grade level because although the virtual positions are related causally to the actual position, and vice versa, the nature of the causal relation itself is of little ‘life and variety’. Still, resonance, vibration, and periodicity remain paradigms of virtuality, and it should not surprise us that such phenomena accompany atomic and desert mirages, neuronal firings, music, optical virtual images, and the virtual reality on the surface of the computer and television screen. These are effects of Thirdness which often involve “generality, infinity, continuity, diffusion, growth, and intelligence” (CP 1.340). Virtuality, then, is a special case of Thirdness, which like all Thirdness “is operative in Nature” (CP 5.93). Thirdness in a rudimentary sense also “embodies Betweenness or Mediation ... which reaches its fullness in Representation.” (CP 5.104) An atomic mirage is a representation to us because we are triadic machines who manipulate nature through experimentation to generate and multiply triads, but to the atom that is made to generate a virtual companion the mirage is something less than a representation, unless of course circumstances allow the mirage to send back signals to the atom and modify its state, in which case it would begin the same long journey from virtual to fully representational reality that we ourselves have taken.

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