Natural
PROPOSITIONS

The Actuality of Peirce's
Doctrine of Dicisigns

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Chapter 3

Dicisigns

3.1   Peirce's Semiotic Doctrine of Propositions

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> I do not, for my part, regard the usages of language as forming a
> satisfactory basis for logical doctrine. Logic, for me, is the study of
> the essential conditions to which signs must conform in order to
> function as such.
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> *Kaina Stoicheia, 1904*[1]

Peirce's doctrine of propositions—"Dicisigns"—has been strangely
neglected. To take an example: no single paper title in the 50-odd years of
publication history of *Transactions of the Charles S. Peirce Society* involves the
notion of Dicisign, and only a small handful of papers address the doctrine un-
der the headline of "propositions".[2] Compared to the voluminous literature on
Peircean sign types such as the icon-index-symbol trichotomy, the type-token
distinction, or the types of inferences, Dicisigns are close to being neglected.
In the development of 20 C logic, Peirce's philosophy of propositions—unlike
his logic formalizations and other results in Peircean logic—has had little in-
fluence, if any.

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[1] This important concise presentation of Peirce's semiotics as of 1904 has the Greek title
of Καινα στοιχεια, meaning "New Elements"—here we refer to the title in Latin letters.

[2] Major contributions include Tom Short's 1984 paper "Some Problems Concerning
Peirce's Conceptions of Concepts and Propositions" (*Transactions* XX, No. 1 Winter 1984)
which leads up to his treatment of the issue in his *Peirce's Theory of Signs* (2008), as well as
and the two related 1992 papers by Risto Hilpinen, "On Peirce's Philosophical Logic: Propo-
sitions and Their Objects" (*Transactions* XXVIII, no. 3, Summer 1992, 467-488) and Nathan
Houser, "On Peirce's Theory of Propositions: A Response to Hilpinen" (ibid. 489-504).

Yet, Dicisigns not only form an early and fairly elaborated doctrine of propositions —independent of that of Bolzano, contemporaneous with those of Brentano and Frege, and earlier than those of Russell, Wittgenstein, the Vienna positivists, etc. Dicisigns also take a very central place in the mature Peirce's semiotics and epistemology, closely related to his doctrine of diagrammatical reasoning. Peircean Dicisigns differ, in important respects, from received doctrines of propositions, and it is our contention that Peirce's semiotic doctrine of Dicisigns, while maintaining antipsychologism and the independence of logic, forms a unique, functionalist, and in a certain sense naturalist theory of propositions.

Already in the period from 1880-85, Peirce constructed his linear formalizations of propositional logic and first order predicate logic— following immediately, but unknowingly, in Frege's 1879 footsteps.[3] These few years apart, Frege and Peirce independently discovered predicate logic with polyvalent predicates and quantification. As has gradually become known, it was Peirce's rather than Frege's much more cumbersome formalization of the *Begriffsschrift* which came, via Schröder, Peano, and Russell, to be taken as the basis for modern formal logic.[4] So Peirce's elaborated doctrine of the Dicisign, primarily developed only in the years around 1900, takes these formal logical breakthroughs of the years around 1880 as their background: the distinction between a quantification part and a Boolean part of propositions (today: the prefix and matrix parts, respectively) became central to Peirce's later analysis of the two functions of Dicisigns in general. But why did Peirce actually care to develop, on top of his early achievements in formal logic, a doctrine of Dicisigns? Two reasons may be inferred. One is that, during the same period, he developed the competing set of logical formalizations known as Existential Graphs, giving, on several points, a new perspective on propositions. The other is that, in this period, he developed his general semiotics, highlighting an interest in which sign vehicles are capable of performing which logical functions, leading him to reformulate and generalize basic sets of distinctions to cover all signs, thus his old icon-index-symbol trichotomy and the classical logical term-proposition-argument triad.[5]

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[3] It can not be excluded that Peirce knew about the *Begriffsschrift* but did not care to read it due to the many unfavorable reviews of it at the time; his student Christine Ladd mentions it in the 1883 *Studies in Logic* by Peirce and his students (cf. Anellis 2012). Frege probably learned Peirce's name from Schröder's (disparaging) 1880 review, but neither of the two explicitly faced the other's ideas nor referred to them.

[4] Cf. Putnam's "Peirce the Logician", in Putnam (1982), 252–260; Anelllis (2012).

[5] A third, more hypothetical, reason might be the appearance of Russell's *Principles of Mathematics* (1903) presenting his early doctrine of propositions. The annotations in Peirce's copy, now at the Houghton Library at Harvard, shows he took some interest in it, although his, mostly disdainful, margin notes primarily are to be found in the beginning of the book

In this chapter I shall reconstruct and discuss, to some degree of detail, Peirce's theory of Dicisigns with a special emphasis on the extension of empirical sign vehicles capable of instantiating propositions or quasi-propositions—as Peirce's interest in this issue forms the most important difference between his doctrine and mainstream ideas of propositions. So let me begin by outlining the extension of Peirce's Dicisign concept.

3.2   The Extension of the Dicisign Concept

Dicisigns are signs, to put it bluntly, which say something about something. This is, for a pragmatist, absolutely central—which is why Dicisigns are taken to be central among "genuine signs" while simpler signs like icons and indices are taken by Peirce to be "degenerate" signs, and unsaturated propositional functions—so-called Rhemes—are characterized as "fragmentary" signs (in the "Kaina Stoicheia", 1904, EP II, NEM IV).[6] The fine-grained varieties of degenerate signs regularly appear as parts or aspects of propositions, but they do not, in themselves, satisify the basic semiotic task of Dicisigns, namely, to convey information: "... no sign of a thing or kind of thing—the ideas of signs to which concepts belong—can arise except in a proposition; and no logical operation upon a proposition can result in anything but a proposition; so that non-propositional signs can only exist as constituents of propositions" ("An Improvement on the Gamma graphs" 1906, 4.583).

· Thus, Peirce's doctrine of Dicisigns constitutes an original and far-reaching account for the semiotics of propositions—also when compared to the doctrines of Frege, Russell, Wittgenstein and the tradition to which they gave rise. Most importantly, Peirce's semiotic theory of Dicisigns does not tie propositions to

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(in pp. 12–24 of the ch. "Symbolic Logic") and so do not cover ch. 4-5 where Russell's theory of propositions is outlined.

[6] Peirce's initial argument here is that symbols are genuine signs in contradistinction to the degenerate sign types of icons and indices. The notion of "degeneracy" comes from the geometry of conic sections where certain sections (the point, two crossing lines, the circle, the parabola) only obtain with particular, non-generic values of the variables, simplifying the equations, as opposed to the generic sections giving ellipses and hyperbolas. Degenerate cases are thus limit phenomena only. Peirce develops the notions of generic and degenerate in relation to his categories in "A Guess at the Riddle" (1888), generalizing the terms from their use in geometry and the study of conic sections. In the "Minute Logic" (1902) and "Kaina Stoicheia" (1904), he applies them to signs. From symbols, Peirce moves to the central type of genuine signs which is propositions—the main issue of "Kaina Stoicheia"—able to express facts: "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,' and by being joined with other signs, to approach as nearly as possible to determining an interpretant which would be the *perfect Truth* (....)" (p. 304). Not all Dicisigns, however, are symbols, cf. below.

human language exclusively, neither in the shape of ordinary language nor of special, formalized languages. This more general doctrine of Dicisigns has several important merits. First, it allows for the consideration of the role played by Dicisigns in pre-human cognition and communication in biology—and thus to envisage an evolutionary account for the development of propositions from very simple biological versions of quasi-propositions and to the much more explicit, articulated, nested, and varied propositions in human cognition and communication.[7] Second, it allows for the investigation of a broad range of human Dicisigns which do not involve language—or which only partially involve language.. This makes possible the study of how pictures, diagrams, gestures, movies, etc. may constitute propositions or participate in propositions—highlighting how non-linguistic signs may facilitate reasoning and appear in speech acts taken in a wider sense, including what could be called picture acts. Third, it connects propositions closely to perception, cf. Peirce's doctrine of "perceptual judgments" realized in the act of perception. Fourth, Peirce's functional definition of Dicisigns liberates them from the idea that conscious intentions, "propositional stances", and the like form an indispensable presupposition for propositions to appear. And fifth, it embeds Dicisigns and their development in a social setting, Peirce taking the step from proposition to proposition in thought to be dialogical and to presuppose the knowledge of a Universe of Discourse shared among dialogue participants. This further allows for a plasticity of interpretation of Dicisigns, relative to the Universe of Discourse in which they partake. This radical extension of Dicisigns, embracing animal sign use on the one hand and non-linguistic human semiotics, perception and dialogical reasoning on the other, does not come without problems, though. The Dicisigns at stake here may appear more implicit, indirect, and vague as compared to the explicitness of declarative sentences in the indicative, expressed in human language, ordinary or formalized, and thus form a notion of propositions which is, in important respects, deflated.

Peirce's doctrine of Dicisigns comprehends propositions proper, linguistically represented and objects of fully conscious propositional attitudes on the one hand—as well as what he himself calls "quasi-propositions", Dicisigns which are not necessarily Symbols, on the other. This is why I generally stick to the term "Dicisign" addressing Peirce's broad notion of propositions—while using "proposition" about the received notion as well as "proposition" as opposed to "quasi-proposition" when these more specific subtypes come up.[8] In this

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[7]Thus, most if not all animal sign use displays the characteristic double function of Dicisigns, cf. below.

[8]It should be added that Peirce's terminology referring to Dicisigns varies, to say the least. Taking his departure in the classic logical trichotomy of Terms, Propositions, Arguments, he invents new terminology in order to indicate his own generalization of that trichotomy

chapter, my aim is threefold. First, to give an account of Peirce's notion of propositions as it appears in the mature version of his semiotics in the years after 1900, peaking in his Dicisign doctrine of 1903 presented in the Pragmatism and Lowell lectures and the *Syllabus*, further elaborated in the 1904 "Kaina Stoicheia", the 1905-6 Monist papers and the letters to Lady Welby 1904-08. Second, to indicate its relation to other central tenets of his theory, particularly that of diagrams and diagrammatical reasoning. Third, to trace the possible contributions of Peirce's doctrine to actual issues of structured propositions, their meaning, objects, type of existence, etc.

3.3   Dicisigns: Signs Separately Indicating their Object

A striking peculiarity of Peirce's logic is its emphasis on logic *as semiotics*— and, correspondingly, the status of all logic entities and figures as signs—as he expresses it by a recurring onion metaphor: "A pure idea without metaphor or other significant clothing is an onion without a peel" ("The Basis of Pragmatism", ca. 1906, EPII, 392). At the same time, Peirce holds a Bolzanian idea of propositions in themselves as ideal entities—as types—facilitating the appearance of tokens of one and the same proposition in very different semiotic acts. The existence mode of propositions is not that of numerical, hic et nunc individual existence, but that of sign types, of mere possibilities—which is why they need semiotic machinery to be able to appear in sign tokens and play a role in actual discourse. For that same reason, the character of that machinery comes to center stage in Peirce's Dicisign doctrine.

True to Peirce's general way of investigating sign types, he describes Dicisigns compositionally, functionally, and systematically. As Hilpinen (1992) says, Peirce's recurrent and "standard" definition of Dicisigns is given in the following italicized passage from "Kaina stoicheia":

> "It is remarkable that while neither a pure icon or a pure index can assert anything, an index which forces something to be an icon, as a weathercock does, or which forces us to regard it as an icon, as the legend under the portrait does, does make an assertion, and forms a proposition. This suggests a true definition of a proposition, which is a question in much dispute at the moment. *A proposition is a*

to cover all signs. That gives terminological results like "Rhemes, Dicisigns, Arguments", "Semes, Phemes, Delomes", or "Sumisigns, Dicisigns, Suadisigns", just like the parallel version of "Dicent Signs" to "Dicisigns". Here, we shall generally stick to the "Rhemes, Dicisigns, Arguments" version. Peircean concepts explicitly being the focus of discussion—like Rhemes, Dicisign, Arguments—shall be capitalized.

sign which separately, or independently, indicates its object." (EP II, 307, emphasis Hilpinen's)[9]

This definition implicitly posits propositions against predicates without any reference indicated, "Rhemes" (cf. the Dicisign "The sky is blue" vs the unsaturated Rheme or propositional function "_is blue"). And it sets Dicisigns apart from simple indices which do nothing but exactly indicate their object (the pointing gesture, the proper name, the pronoun, etc.), thus not performing their indicating *separately* from other aspects of their functioning. Moreover, it is this definition which implies that Dicisigns comprehend more than full-blown general, symbolic propositions and also involve quasi-propositions like Dicent Sinsigns and Dicent Legisigns[10]—they qualify for the basic reason that they, too, separately indicate their object. Photographs, for instance, may function as Dicent Sinsigns, just like statements of identity, location or naming may function as Dicent Legisigns. Such quasi-propositions, like the pointing of a weathercock, even give the core of the definition: "It is, thus, clear that the vital spark of every proposition, the peculiar propositional element of the proposition, is an indexical proposition, *an index involving an icon*" ("Kaina Stoicheia", 1904, EPII, 310, italics added). The weathercock is a quasi-proposition because of its indexical connection with the wind, involving the icon of turning in the wind's direction. Full-fledged linguistic propositions realize this same structure by grammatical means—but this is no special capacity of language as such. Rather, language is adapted to fit Dicisign structure. Thus, this basic definition makes clear the large extension of Peirce's Dicisign category. This maybe surprising definition of the Dicisign is closely connected, however, to the basic function of the Dicisign, namely to convey information— to relay claims, assert statements, true or false. Only by separately indicating an object does it become possible for a sign to convey information about that object, correctly or not:

> "... the essential nature of the *Dicisign*, in general, that is, the kind of sign that *conveys* information, in contradistinction to a sign from which information may be derived. The readiest characteristic test showing whether a sign is a Dicisign or not, is that a Dicisign is either true or false, but does not directly furnish reasons for its being so." (*Syllabus*, 1903, EPII, 276)

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[9]This idea is present already in "On a New List of Categories" (1868) where Peirce outlines the classic distinction term-proposition-argument and defines propositions as follows: "Symbols which also [in addition to determining imputed qualities, FS] independently determine their *objects* by means of other term or terms, and thus, expressing their own objective validity, become capable of truth and falsehood, that is, are *propositions*." (EP I, 8)

[10]In the ten-sign taxonomy of the *Syllabus*.

Dicisigns are thus signs which may be assigned a truth value—without providing, themselves, reasons for that value. The implicit countercategory here is the Argument, involving more than one Dicisign and explictly giving reasons for its being true. The distinction between signs conveying information and signs from which information may be derived points to the possibility of deriving information from icons—crucial to diagrammatical reasoning. When such information is actually derived, however, it will be structured as a Dicisign. The most simple example of this is perceptual judgment (see next chapter). I see a certain configuration of crafted wood and derive the information "This is a chair", linguistically expressed or not. Even if I do not convey this information to anybody else but myself in an act of communication, Peirce insists that individual reasoning also takes the shape of dialogic communication. When concluding "This is a chair", I communicate this to myself, that is, to a version of myself existing a moment later, thus conveying information to myself in the shape of a Dicisign.

3.4   The Double Function of the Dicisign

The function of expressing truth or falsity is possible only by means of the Dicisign having a particular double structure which Peirce describes in various ways, already in the early nineties:

> "Every assertion is an assertion that two different signs have the same object." ("Short Logic", 1893, 2.437)

An assertion is the speech act of claiming that a proposition is true.[11] As a sign, the proposition must involve those two different signs: it must, at the same time, fulfill two functions connecting it in two different ways to the same object, the index and the icon mentioned above. This is the reason why many propositions possess an internal structure composed from two separate parts, each fulfilling its specific function. Oftentimes, Peirce generalizes the classical notions of subject and predicate to account for these two aspects of Dicisigns:

> "It must, in order to be understood, be considered as containing two parts: Of these, the one, *which may be called the Subject,* is or represents an Index of a Second existing independently of its being represented, while the other, *which may be called the Predicate,* is or represents an Icon of a Firstness." (*Syllabus*, 1903, EPII, 277; 2.312)

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[11] Despite Austin's famous claim to the contrary, Peirce does in fact distinguish between a proposition, the tokens representing it (sentences), the belief of a proposition (the assent to it), and the public claim of a proposition (the assertion of it), cf. below.

A Dicisign thus may perform its double function by means of having two parts, a subject part referring-by means of some version of an index (maybe indirectly by an indexical symbol like a pronoun or a quantifier or an indexical legisign like a proper noun) to the object of the Dicisign, and a predicate part, describing that object by means of an icon of some quality (maybe indirectly by an iconical symbol like a linguistic predicate). As Hilpinen remarks, this is an Ockhamist idea, William of Ockham defining the possible truth of a proposition by the possibility that the subject and the predicate "supposit for the same thing" (Hilpinen 1992, 475), that is, refer to the same object. So the doubleness of the Dicisign is what enables it to express truth: it is true in case the predicate actually does apply to the subject—which is the claim made by the Dicisign.

> "That is to say, in order to understand the Dicisign, it must be regarded as composed of two such parts whether it be in itself so composed or not. It is difficult to see how this can be, unless it really have two such parts; but perhaps this may be possible."
> (*Syllabus* 1903, EPII, 276; 2.311)

Central examples—for instance, that of a photograph—do indeed indicate that the Dicisign may play those two independent roles without explicitly being articulated in two separately identifiable parts of the sign, as Peirce realizes a bit later in the *Syllabus*. The photograph's indexical connection to its object via focused light rays stemming from that object, influencing a photographic plate, whether chemically or electronically, plays the subject role of the Dicisign, granting the connection of reference between sign and object; while the shapes, colours and other qualities formed on that plate play the predicate role—even if those two roles are not explicitly separated as distinct parts of the photographic sign itself. Still, the two are clearly functionally separate, constituting two aspects of the sign rather than two distinct physical parts of the sign vehicle.

Peirce's analysis of the predicate part or aspect of the Dicisign is closely connected to the Russian-doll structure of the Rheme-Dicisign-Argument triad, where Dicisigns in a certain sense contain Rhemes and Arguments similarly contain Dicisigns. Rhemes are what is left if one or several Subjects of a Dicisign are erased:

> "If parts of a proposition be erased so as to leave blanks in their places, and if these blanks are of such a nature that if each of them be filled by a proper name the result will be a proposition, then the blank form of proposition which was first produced by the erasures is termed a *rheme*. According as the number of blanks in a rheme is 0, 1, 2, 3, etc., it may be termed a *medad* (from μηδαν,

nothing), *monad, dyad, triad,* etc., *rheme.*" (*Syllabus,* 1903, EPII, 299; 2.272)

Thus, Rhemes correspond to what is now often called propositional functions with the caveat that they comprehend also a vast range of non-linguistic predicates.[12] Peirce, originally a chemist, made this analysis of polyadic predicates modeled upon the notion of chemical valency. For the same reason he saw predicates as unsaturated, calling for saturation by indices in one or more of their blanks. For instance, in the proposition "Peer gives an answer to Svend", one or several of the subjects "Peer", "answer", and "Svend" may be erased to give Rhemes like "___ gives an answer to Svend", "Peer gives a ___ to ___", "___ gives a ___ to ___", etc. To Peirce, unlike Frege or Russell, the predicate includes the copula—in "The sky is blue", the predicate Rheme will be "_ is blue".[13] This allows for him to include a wide variety of expression types under the Rheme predicate category—linguistically, verbs as well as adjectives and common nouns, with the copula added, constitute Rhemes. Outside of linguistics, pictures, images, diagrams, gestures, etc. may form Rhemes and thus appear as the predicative, propositional-function part of Dicisigns. Common to all predicate Rhemes is that they involve an iconic, descriptive sign. So, the important basis of this double aspect theory of the proposition is that one and the same complex sign—the Dicisign—in some way indicates an object by a direct index or by some more indirect identification procedure for

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[12]Later in the *Syllabus*, Peirce realizes that the Subject terms of propositions must *also* be classified as Rhemes (in the ten-sign combinatory, e.g., proper names are classified as Rhematic Indexical Legisigns). This seems to imply that they, too, must be considered as unsaturated. That all constituents of propositions must be Rhemes follows immediately from the idea that Rheme-Dicisign-Argument is Term-Proposition-Argument generalized so as to be a tripartition of all signs—as Peirce later says "A rheme is any sign that is not true nor false," (Letter to Lady Welby 12 Oct 1904, 8.337). A corollary of this, as Bellucci argues (2013a), is that Peirce's analysis of propositions differs from Frege's in an important respect: while Frege saw predicates (Fregean functions) as unsaturated, he did not see subjects (Fregean arguments) as unsaturated. In Peirce's doctrine, *both* must be unsaturated and, in some sense, in need of completion by means of each other. He even compares them to the groups of halogens and alkali metals in the periodic table of elements, with the chemical valencies of -1 and 1, respectively, known to form stable compounds (Na^+ and Cl^-, eg., forming $NaCl$, salt).To Peirce the chemist, it seemed obvious that both atoms of a molecule must possess matching valencies, plus and minus, respectively. A corollary of this idea is that proper names do not, as little as predicates, form autonomous signs outside of their saturation in Dicisigns, and thus also qualify as Rhemes. Despite this generalized notion of Rheme, however, it may be a source of confusion that Peirce continues to use "Rheme" simultaneously in the more restricted sense referring to predicates or propositional functions specifically.

[13]The traditional role of the copula of asserting the proposition is, in Peirce's account, analyzed as external to the structure of the proposition itself; assertion is performed by a speech act affirming the proposition in a social setting.

retrieving the object or set of objects referred to (maybe involving a proper name or other symbolic index, a common noun, quantification, etc.) and, at the same time, furnishes a description of that object given in the predicative, Rheme aspect of the Dicisign. These two aspects form the basis of the purely *functional* definition of propositions:

> "Thus, every proposition is a compound of two signs, of which one functions significantly, the other denotatively. The former is intended to create something like a picture in the mind of the interpreter, the latter to point to what he is to think of that picture as being a picture of." ("Basis of Pragmatism" 1905, Ms. 284, 43)

So, the basic function of the predicative aspect of the Dicisign is to yield an iconic description of the sign's object. This, however, is not all. By including the copula and the number of blanks involved in the predicate given, the predicative side of the Dicisign includes all that is not immediately indexical:

> "The most perfectly thorough analysis throws the whole substance of the Dicisign into the Predicate." (*Syllabus* 1903, EPII, 281; 2.318)

This implies that the predicate also includes the *syntax* of the Dicisign making of the predicate-subject composite a claim, cf. the idea that the predicate is "...representing (or being) an Icon of the Dicisign in some respect" (*Syllabus*, EPII 279, 2.316), cf. below. The predicate not only depicts certain characters of the object, it also depicts the Dicisign claiming those characters to pertain to the object. The predicate iconically describes that very aspect of the Dicisign— its syntax. So, the predicate operates on two levels simultaneously, on the object and metalanguage level, as it were. We shall return to this syntax below.

The fact that Peirce chose the age-old terminology of subject-predicate from Aristotelian logic in his structured proposition doctrine of Dicisigns hid, to some degree, the radicality of it and did not help the spread of it. Jean van Heijenoort's influential history of logic (1967) constructed the "Fregean revolution" as leading almost directly from the *Begriffsschrift* to Russell and modern formal logic, thereby sidelining the strong role played, also in Peano and Russell, by the tradition of algebraical logic: Boole, de Morgan, Jevons, Peirce, Schröder etc. (cf. Anellis 1995; 2012).[14] Among Heijenoort's major claims was that the latter aimed at a mere calculus for logical computing, not a representational language for inferencing; that the algebraists did not grasp quantification (even if Peirce and his student O.H. Mitchell were, in 1883, the

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[14] Cf. also Shin 2013.

first to introduce a version of the modern notation of it), and, decisively, that the algebraists stuck to Aristotelian subject-predicate logic and failed to follow Frege's ground-breaking function-argument distinction instead. Peirce's idea of "throwing all" of the analysis of the Dicisign into the predicate, however, parallels Frege's function-argument strategy for carving up propositions—but sticking to the old surface terminology, Peirce did not immediately signal this radicality of his doctrine. As is already evident, Peirce's logic did not address calculation only and functions as a representative language just as much as the Frege tradition—albeit in a broader sense of "language". To him, calculation is the root of the understanding of inference as diagram experimentation:

> "But to say of the one notation or the other that it is of *no use* except for the working of the machinery of a calculus is to betray complete ignorance of the method of mathematical research. This is performed by experimentation upon diagrams; and the utility of the notations for this purpose consists in their enabling us to supply the bricks for building diagrams." ("The Basis of Pragmaticism," 1905, Ms. 283, 117 of one variant)

It is true Peirce did distinguish logic as practical calculation from logic as a science—but that is different from any distinction between calculus and representative language. It is rather the distinction between *logica utens*, logic for practical purposes, and *logica docens*, logic as the study of the steps of reasoning where Peirce saw the motive of his Existential Graphs as the latter rather than the former.

The algebraic tradition, moreover, was what allowed Peirce's doctrine to be even more radical than Frege regarding the extension of predicates far beyond language. Despite his graphical notation, Frege was interpreted as staying close to the idea of logic as a language—while Peirce's adherence to the algebraic tradition was what permitted him to transcend human language as basis for logic and, in fact, more so than Frege, to integrate both computational and inferential aspects of logic.

3.5 The Indexical Side of Dicisigns

As already noted, Peirce's first formalization of logic—in (1883) and the two "Algebra of Logic" papers in the 1880s—formed the first version of standard modern formal logic which later adopted Peirce's ideas via the intermediaries of Schröder and Peano. Thus, the central idea is to separate completely the two aspects of the proposition; quantification of variables on the one hand, predicates and their interrelations on the other—the indexical and iconical

parts, as it were. In our day's terminology, the prenex normal form of the proposition, distinguishing the quantifier prefix part of it from its quantifier-free matrix part. Thus the isolation of the indexical part in the shape of a pointing gesture, a proper name, a constant or a quantified variable makes possible the corresponding isolation of the predicate and syntax—the idea of throwing all of the substance of the Dicisign into the predicate.

In the simplest cases, the index is simply the drawing of attention to the objet of the Dicisign—by a pointing gesture, an adverb, pronoun or a proper name identifying the object, or any other way of indicating the object of the proposition:

> "Thus the subject of a proposition if not an index is a precept prescribing the conditions under which an index is to be had." ("Lectures on Pragmatism", III, 1903, EPII, 168)

An index putting the receiver in a direct, immediate, causal contact with the object referred to thus forms the prototypical version of the subject part of a proposition (cf. the simple examples of a weathercock causally connected to the wind)—and all more complicated propositions in principle furnish information about how to retrieve such an index; that is the task, e.g., of proper names and quantifiers. Proper names are connected to the objects by means of an early version of rigid designation:

> "A proper name, when one meets with it for the first time, is existentially connected with some percept or other equivalent individual knowledge of the individual it names. It is *then*, and then only, a genuine Index. The next time one meets with it, one regards it as an Icon of that Index. The habitual acquaintance with it having been acquired, it becomes a Symbol whose Interpretant represents it as an Icon of an Index of the Individual named." (*Syllabus*, 1903, EPII, 286)

Quantification is now analyzed in dialogic terms. Existential quantification reserves the right to select an appropriate object to the speaker of the Dicisign, while universal quantification hands over the right to the selection of appropriate objects to the receiver of the Dicisign—forming the kernel of Peirce's early version of game–theoretical semantics (cf. Hilpinen, Pietarinen, etc.).[15]

An important, pragmatic difference to the standard theories, however, is that the indexical part of the proposition is subject to interpretation given the context of the utterance. In many cases, there is a tacit understanding

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[15] See ch. 6.

(cf. below on "collateral information") which objects are indicated so that the explicit reference to them in the shape of indices may be underdetermined:

- "When we express a proposition in words we leave most of its singular subjects unexpressed; for the circumstances of the enunciation sufficiently show what subject is intended and words, owing to their usual generality, are not well-adapted to designating singulars. The pronoun, which may be defined as a part of speech intended to fulfil the function of an index, is never intelligible taken by itself apart from the circumstances of its utterance; and the noun, which may be defined as a part of speech put in place of a pronoun, is always liable to be equivocal." ("Lectures on Pragmatism", VI, 1903, EPII, 209; 5.153)

Thus, Peirce's insistence that Dicisigns are indeed signs gives his theory an important flexibility where implicit information agreed upon by the interlocutors and the specific Universe of Discourse they address may form part of the interpretation of Dicisigns. We shall return to this in more detail below.

3.6   The Iconical Side of Dicisigns

As to the predicate side of the Dicisign, it "...only conveys its signification by exciting in the mind some image or, as it were, a composite photograph of images, like the Firstness meant" (*Syllabus* 1903, EPII, 281; 2.317). This idea is that a central function of the predicate is to invoke a *general* image of the property signified. This should not, of course, be mistaken for psychological imagery subject to the fancy of the individual.[16] Rather, the important and controversial idea here is that *general*, schematic images play a central role in logic and cognition. This comes to the fore in Peirce's theory of diagrams and diagrammatical reasoning— diagrams being relational icon *types* capable of instantiation in different tokens, just like linguistic entities may be so instantiated. In the quote given, Peirce uses the metaphor of the photographic technique of the time known as "composite photograph" (cf. Hookway (2002)), the practice of subjecting the same photographic plate to subsequent exposures of related objects giving rise to a generalized picture subsuming the individual contributions as instances and blurring individual detail. Sometimes such procedures are still used, e.g. to give an idea of the "woman of the year", superposing images of a series of celebrity fashion models to give a general image

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[16]Peirce was just as much opposed to psychologism as was Frege, and even antedated him on this issue in his 1860s papers (cf. ch. 2).

of the ideal woman of the moment. Composite photographs here function as an example of schematic images with general content as such.

This idea lies behind the enormous variety of predicate signs admitted in Peirce's Dicisign doctrine, one of the most important differences to the standard logical tradition. Photographs, paintings, moving pictures, diagrams, graphs, algebras, gestures, object samples—in short, all possible description devices may enter into Dicisigns to perform the functional task of predicative iconicity in the Dicisign: "All icons, from mirror-images to algebraic formulae, are much alike, committing themselves to nothing at all, yet the source of all our information. They play in knowledge a part iconized by that played in evolution according to the Darwinian theory, by fortuitous variations in reproduction" ("Reason's Rules," 1902, Ms. 599, 42). Indices, by contrast, would then play the role of connecting certain selected icons to reality, granting them existence and thus ensuring their survival over others.

Very often, Peirce takes as the immediate example of a proposition the painting with a legend[17]—such as in the short version of his 1903 list of ten signs given in a letter to Lady Welby (12 Oct 1904) where it forms the example of the seventh category of "Dicent Sinsigns"—one-shot quasi-propositions, as it were:

"7. Dicent Sinsigns (as a portrait with a legend)" (8.341)

In the *Syllabus*, this idea is elaborated:

"A proposition is, in short, a Dicisign that is a Symbol. But an Index, likewise, may be a Dicisign. A man's portrait with a man's name written under it is strictly a proposition, although its syntax is not that of speech, and although the portrait itself not only represents, but is a Hypoicon. But the proper name so nearly approximates to the nature of an Index, that this might suffice to give an idea of an informational Index. A better example is a photograph. The mere print does not, in itself, convey any information. But the fact that it is virtually a section of rays projected from an object *otherwise known*, renders it a *Dicisign*. Every Dicisign, as the system of Existential Graphs fully recognizes, is a further determination of an already known sign of the same object. (...) It will be remarked that this connection of the print, which is the quasi-predicate of the photograph, with the section of the rays, which is the quasi-subject, is the Syntax of the Dicisign; and like

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[17]This has rarely been elaborated in Peirce scholarship. Jappy's introduction to Peircean visual semiotics (2013), however, includes cross-modal Dicisigns under the headline "Pictura Loquens" (150-51).

the Syntax of the proposition, it is a *fact* concerning the Dicisign considered as a First, that is, in itself, irrespective of its being a sign. Every informational sign thus involves a fact, which is its Syntax." (*Syllabus*, EPII 282, 2.320)

The idea, of course, is that the portrait painting forms the predicate part of the Dicisign, while the title of the painting provides the subject part, informing about which person it is who is claimed to possess (some of) the visual properties showed by the canvas. The very physical painting is, of course, a sinsign,[18] but it should be mentioned that—especially in an era of easy picture reproduction—similar replicas of the painting may exist in abundance so that the portrait, taken in a generic sense, may be used not only as a sinsign but also as a Dicent Symbol. Without a title or legend, the isolated painting is but an unsaturated predicate—a rheme:

"But a pure picture without a legend only says 'something is like this: '" (Review of Lady Welby, 1903, 8.183)

This requires, of course, that we add to the pure unsaturated predicate the vague index "something"; the erasure of the indexical part is taken to be equivalent to the positing of the vaguest index possible, existential quantification. In general, the large variety of possible predicate types is argued by the following argument:

"A proposition never prescribes any particular mode of iconization, although the form of expression may suggest some mode. [...] ...it is true (and a significant truth) that every proposition is capable of expression either by means of a photograph, or composite photograph, with or without stereoscopic or cinetoscopic elaborations, together with some *sign* which shall show the connection of these images with the object of some index or sign or experience forcing the attention, or bringing some information, or indicating some possible source of information; or else by means of some analogous icon appealing to other senses than that of sight, together with analogous forceful indications, and a sign connecting the *icons* with those *indices*." ("Reason's Rules", 1902, Ms 599 5–7)

It is unclear, however, in what sense the Dicisign expressed by means of a photographic predicate could be said to be the *same* as a Dicisign about the same object using, e.g., linguistic or algebraic predicates. It is easy to see that

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[18] Referring to his first trichotomy (pertaining to the quality, the existence and the type of the sign itself), Peirce uses tone/token/type and qualisign/sinsign/legisign interchangeably.

there may be considerable overlap between such predicates and that collateral information may add to the identification of the relevant aspects of the predicates to be picked out, but still the painting of Louis XIV with a legend conveys much more information of his looks than does, e.g., the linguistically expressed Dicisign saying "That day, Louis XIV wore a grey wig" which may communicate only a minor subset of the information rendered by the painting.[19] Here, Peirce's theory of pictorial predicates certainly is in need of further development; we shall return to that below. A vast field of predicates is furnished by diagrams. In Peirce's philosophy of mathematics, the access to mathematical objectivities is granted by diagrams in general—but also in everyday reasoning diagrams, in the shape of maps, tables, matrices, graphs, schemas, scenarios, etc. form a wide variety of simple and complex predicates for use in propositions, sometimes, as in maps, furnishing continuous, complex Dicisigns which may give rise, in turn, to the inference of an indefinite number of linguistic propositions.

A very important corollary of the breadth of predicate possibilities for Dicisigns is the much more widespread appearance of propositions and quasi-propositions in human semiotic life than is apparent from the classic linguistics-centered view of propositions. Newspaper articles with photographs, TV news items with film clips and voice-over speak, cartoon frames with images and dialogue, algebraic equations, maps with locations and events indicated, artworks with titles, internet combinations of pictures and text of many sorts may, on this view, constitute Dicisigns conveying information, true or false; cf. ch. 7.

3.7 The Syntax of the Dicisign

A classic query pertaining to structured propositions, given the analysis of them into characteristic parts, is what keeps these parts together. The mere sum of the two elements, of course, does not constitute a proposition. To Frege, it seems to have been a composition of senses, resulting in the overall sense of the proposition, in turn picking out its reference (to Frege, a truth value). Propositional functions require saturation, which they receive by arguments—corresponding to Peirce's subjects. Russell's solution (1903; before he abandoned propositions and reinterpreted them as multiple relations kept together by judgments (1910)) dispenses with sense or meaning altogether, taking parts of the sentence expressing a proposition to be directly connected to reality counterparts: the proposition consists of objects and relations, so-

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[19] A recent version of this argument: Kitcher and Varzi (2000).

called Russellian propositions.[20] The sentence expressing it is composed from "terms" of which there are essentially proper names and verbs. Verbs are, by nature, unsaturated and thus the composition of the proposition sentence is prompted by their saturation. But verbs and terms directly correspond to real relations and objects making up the proposition. Verbs, simultaneously, are taken to be responsible for the assertion of the proposition. Russell's account, of course, is restricted to languages, and he does not solve the deeper and more general issue of the unity of the proposition by relying upon the linguistic example of word class categories. Wittgenstein famously took the logical form of the proposition to be ineffable. Peirce addresses this issue in

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[20] Peirce increasingly turned against the purely extensional definition of sets in early set theory, giving rise to the idea of extensional semantics that a term may be defined by the set of individuals falling under it. Instead, Peirce restricted the notion of sets (here: "class") to collections of elements defined by some intension: "Whatever ~~collection gath~~ sam there may be to whose members, and to them alone, any sign applies, to is called the *breadth* of the sign. [...] Now the *breadth* of a descriptive appellation has an *essence*, or Imputed Firstness; which is the signification, or *Depth*, of the appellation. Take the word *phenix*. No such thing exists. One naturally says that the name has no *breadth*. That, however, is not strictly correct. We should say *its breadth is nothing.* That breadth is precisely what I mean by a *sam.* Therefore I define a *sam* as an *ens rationis* having two grades of being, its essence, which is the being of a definite quality imputed to the sam, and its existence which is the existence of whatever subject may exist that possesses that quality. A *gath*, on the other hand is a subject having only one mode of being which is the *compound of* the existence of subjects called the *members* of the *gath.*

You may remark that a sam is thus defined with[out] any reference at all to a gath. I repeat the definition, so that you may observe this:

A *sam* is an *ens rationis* whose essence is the being of a definite quality (imputed to the sam) and whose existence is the existence of whatever subject there may be possessing that quality.

On the other hand, it is impossible to define a gath without reference to a sam. For when I say that a gath is a subject whose only mode of being is the compounded existence of definite individuals called its members, what is the meaning of this *compounded* existence? It is plain that the idea of a compound is a triadic idea. It implies that there is some sign, or something like a sign, which picks out and unites these members. Now the fact that they are all united in that compound is a quality belonging to them all and to nothing else. There is thus here a reference to a possible *sam* which does this. Thus, we might as well at once define a *gath* as a subject which has but one mode of being which is the existence of a *sam.* From this fact, that a gath cannot be defined except in terms of a sam, it follows that if by a collection be meant, as ordinarily is meant, a gath; while a gath is not distinguished from a sam, it becomes utterly impossible to define what is meant by a collection." (Ms. 469. Lowell Lectures. 1903. Lecture 5. Vol. 1, 16)

Gaths are extensionally defined sets which may only artificially be loosened from their foundation in Sams, in intensionally defined sets. Even the classical way of defining a set—by means of a list—is taken to be intensional which sounds strange indeed for finite sets. Of course, as soon as you reach infinite sets, no definitive list may be given, so some algorithm or other intensional description must be given in order to indicate the extension. This, of course, effectively excludes any purely extensionalist semantics for non-finite sets.

some of his most convoluted developments of the Dicisign doctrine, especially in the *Syllabus* and "Kaina Stoicheia". As is already evident, Peirce does not—against tradition—accord any special place to the copula as a third constituent of the proposition. The assertion sometimes attributed to the copula or the predicate is relegated to the speech act use of propositions, external to their inner structure. The verbal aspect of the proposition is taken to be part of the predicate, and so the syntax of the proposition is inherent in the structure of the predicate. Not any old combination of an index and an icon necessarily constitutes a Dicisign—the two should be represented as involving the same object by means of some syntactic connection between the two aspects of the Dicisign:

> "Finally, our conclusions require that the proposition should have an actual *Syntax*, which is represented to be the Index of those elements of the fact represented that corresponds to the Subject and Predicate." (*Syllabus*, 1903, EPII, 282)

Thus, the syntax claims that the Dicisign is *really* indexically connected to the real fact to which subject and predicate correspond. How could the syntax be said to make such a claim? What is often taken to be the function of the copula, Peirce instead analyzes as an index connecting the tokens of the subject and the predicate, respectively, in the sign:

> "It may be asked what is the nature of the sign which joins 'Socrates' to '_ is wise,' so as to make the proposition 'Socrates is wise.' I reply that it is an index. But, it may be objected, an index has for its object a thing hic et nunc, while a sign is not such a thing. This is true, if under 'thing' we include singular events, which are the only things that are strictly hic et nunc. But it is not the two signs 'Socrates' and 'wise' that are connected, but the replicas of them used in the sentence. [...] No other kind of sign would answer this purpose; no general verb 'is' can express it." ("Kaina Stoicheia", EPII, 310)

So the very combination, in the actual, expressed proposition token, joining the token of the predicate icon and the token of the subject index is taken to be, in itself, indexical. This index—as always in a proposition—involves an icon which is, in turn, the very spatial *juxtaposition* of the two sign tokens: "...it is the juxtaposition which connects words. Otherwise they might be left in their places in the dictionary" (ibid.). The very filling-in of the predicate token blanks by means of token subjects is, in itself, the iconical device showing their indexical connection claimed by the Dicisign. This, of course, places a special

emphasis on the notion of "juxtaposition" of which grammatical connection is only one possibility.

Other examples include an object used as a sample, endowed with a label naming it (like a stuffed animal with a caption indicating the species):

> "It is sometimes written upon the object to show the nature of that object; but in such case, the appearance of that object is an index of that object; and the two taken together from a proposition." ("Kaina Stoicheia", EPII 310)

So, in general, co-localization seems to form a primitive, pre-linguistic syntax sufficient to connecting the subject and predicate tokens as a sign of the combination of the subject and predicates themselves in a proposition.[21] In human languages, such co-localization has further developed into the detailed conventions of grammar, word order, case, inflections and other grammatical devices to govern the composition of linguistic propositions. Already in pre-linguistic or mixed-media Dicisigns, however, simple co-localization may give rise to conventionalizations, such as the two different types of co-localizations using proper names in much Western painting (here, "symbol" is referring to propositions):

> "So, if a symbol is to signify anything, and not be mere verbiage, or an empty logical form, it must ultimately appeal to *icons* to *monstrate* the elementary characters, both of sense and of conception. One of the simplest examples of a symbol that can readily be found is, say, the portrait of a man having printed under it AN-DREAS ACHENBACH. This form of conjunction of an icon and an index is a symbol telling me that the celebrated artist looked like that. It has that signification, because of the rule that names so prominently printed under portraits are those of the subjects of the portraits. Were the same name to be found written small upon the portrait in one of the lower corners, something altogether different, and not so simple, would be conveyed." (Ms. 1147, the largest of several drafts of the article "Exact Logic" for the Baldwin dictionary, 12)

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[21]Interestingly, the analysis in King's recent (2007) book-length defense of structured propositions ends with assuming the "syntactic concetanation" (34) as a primitive, resulting in this description of the proposition: "...we can think of this bit of syntax as giving the instruction to map an object o (the semantic value of the expression at its left terminal node) and a property P (the semantic value of an expression at its right terminal node) to true (at a world) iff o instantiates P (at that world)." (ibid.)—close to the Peircean assumption of co-localization syntax as primitive (without referring to Peirce's arguments).

Two different locations relative to the painting predicate indicate different grammatical roles of the proper names given there: that of the subject of the proposition, on the frame, and that of the maker or utterer of the picture sign, in the corner (sometimes elsewhere on the painting surface or on its back side).

.The syntax of the proposition is also the starting-point of the investigation of its interpretant in *Syllabus*. The object of the Dicisign, of course, is the entity referred to by the subject. The interpretant is not merely the predicate, but the claim, made possible by the syntax, that the predicate actually holds about an existing object:

> "...the Interpretant represents a real existential relation, or gen-
> uine Secondness, as subsisting between the Dicisign and the Di-
> cisign's real object." (*Syllabus*, 1903, EPII, 276; 2.310)

This leads Peirce to the surprising conclusion that—since the object of the interpretant is the same as that of the sign itself—this existential relation between Dicisign and object forms, *in itself*, part of the object of the Dicisign. Consequently, the Dicisign has *two* objects; one, primary, is the object referred to—another, secondary, is the very reference relation claimed to exist between the Dicisign and that object:

> "Hence this same existential relation [between Sign and Object]
> must be an Object of the Dicisign, if the latter have any real Ob-
> ject. This represented existential relation, in being an Object of
> the Dicisign, makes that real Object, which is correlate of this re-
> lation, also an Object of the Dicisign. This latter Object may be
> distinguished as the *Primary Object*, the other being termed the
> *Secondary Object.*" (*Syllabus*, 1903, EPII 276; 2.310)

What is here called Primary/Secondary object is what is later developed into the doctrine of Dynamic/Immediate Object, cf. below. Correspondingly, the predicative part describes some character of the Primary Object—at the same time as it depicts the indexical relation which the Dicisign claims to hold between itself and its object. This is, in short, the truth claim of the proposition— which can be analyzed as the Dicisign saying there exists indeed an indexical relation between itself and its object. This is why the Dicisign, in its interpretant, is represented as having two parts, one referring to the object, and the other—the predicate—referring to the relation between the sign itself and the object. And, in turn, this is why

> "...in order to understand the Dicisign, it must be regarded as
> composed of two such parts whether it be in itself so composed or
> not." (ibid.)

Hence, the Dicisign must, at the same time, present, iconically, the connection between those two parts:

> "...the Dicisign must exhibit a connection between these parts of itself, and must represent this connection to correspond to a connection in the Object between the Secundal Primary Object and First-ness indicated by the part corresponding to the Dicisign." (ibid., 277)

This implies Peirce's second conclusion. The co-localization of predicate and subject tokens in the expression of a proposition not only functions as a picture of their co-presence in the object—it also functions as a representation of the indexical relation between the sign itself and the object:

> "Second: These two parts must be represented as connected; and that in such a way that if the Dicisign has any Object, it [the Dicisign] must be an Index of a Secondness subsisting between the Real Object represented in one represented part of the Dicisign to be indicated and a Firstness represented in the other represented part of the Dicisign to be Iconized." (*Syllabus* 1903, EPII 277; 2.312)

So, the syntax of the Dicisign connecting its two parts mirrors 1) that of the combination of its real object and its alleged property into a fact, as well as 2) the indexical relation which the Dicisign claims to exist between itself and the object. This also explains what lay in Peirce's idea of "throwing all" of the analysis of the Dicisign into the predicate. It is not only an unsaturated predicate icon describing some relational property in the object—it also involves the truth claim part of the proposition, picturing the claimed connections between this property and some object(s) to be specified by subject(s) in its blanks.

We may sum up this complicated analysis as follows:

Dicisign:		
Index Tokens (of the Subject Indices)	—*co-localized in the sign with an*—	Icon Token (of the Predicate Icon)
referring to:		describing:
1) Primary Objects	—*co-localized in reality with the*—	Depicted Character
2) Secondary Object: The Indexical Connection Dicisign-Objects	—*claimed by the*—	Depiction of The Connection Dicisign-Objects (by co-localization of index tokens within the icon token) ·

In the simplest Dicisigns—Peirce's recurring examples being Dicent Sinsigns like the weathercock and the painting with a legend—these syntactic relations appear in a causal and purposive variant, respectively. The weathercock causally forces an icon of the direction of the wind to appear—so here the primary object is the wind, and the depicted character its direction. The secondary object is the causal relation between the two, granted by the mechanical structure of the weathercock, giving the iconical co-appearance of the wind and its represented direction. In the painting, the connection between the icon and index is purposive: the primary object is Louis XIV and the depicted characters the shapes and colors which the painting represents him to possess. The addition of a subject index on a blank part of the predicate (the frame) provides the iconic co-localization which is taken as a sign of the secondary object: the alleged real, indexical relation between the legend and the picture.[22]

[22] As mentioned, one can compare Peirce's account with recent investigations of structured propositions like King (2007). King proposes that propositions *are* a certain sort of facts, so that the proposition expressed in English as "Rebecca swims" *is* the fact that "there is a context c and there are lexical items a and b of some language L such that a has as its semantic value in c Rebecca and occurs at the left terminal node of the sentential relation R that in L encodes the instantiation function and b occurs at R's right terminal node and has as its semantic value in c the property of swimming" (39). This fact is thus different from the fact—Rebecca swims—which is the truth-maker of the proposition (King himself realizes the strange corollary that the fact which the proposition claims is the case is not immediately given by his redescription of the proposition; the same may be said about Peirce's redescription). King's definition involves the whole linguistic machinery in the virtual expression and reference of the proposition: the possibility of expressing a sinsign

As Bellucci (in prep.) argues, Peirce's presentation in the *Syllabus* intends to "...deduce the proposition's structure from its basic conception as 'bearer of truth-values'." (16). A long, complicated argument spanning several pages—a maze of abstractions, Peirce himself admits—is taken to undertake this deduction (*Syllabus*, 1903, EPII 275-77). The double structure of the Dicisign—as well as its double object and the co-localization of its parts as an iconic sign of the Dicisign's claim to be an index—all this is taken to follow with necessity from the basic capability of the Dicisign to take a truth value. As Bellucci rightly remarks, "...nothing substantially new is achieved by the deduction which was not already part of the picture presented (...)" (ibid.)—the interest of the deduction is to develop all of its aspects from its truth value capability solely. The deduction takes three steps: 1) an initial definition of Dicisigns with the emphasis on truth; 2) the argument that this definition requires Dicisigns to possess a specific double structure; 3) the detailed description of those two parts. The first step is Peirce's analysis of the truth claim of the Dicisign to be equivalent to the fact that the interpretant of the proposition "...represents the proposition to be a genuine Index of a Real Object, independent of the representation" (*Syllabus*, 1903, EPII, 278; 2.315). Thus, the Dicisign's claim to truth is equivalent to it claiming to be a real index of what it represents. The second and most labyrinthine step is that for this reason, the Dicisign must have two parts. The first step established that the interpretant of the Dicisign claims it to be an index—but, as that interpretant must have the same object as the sign it is an interpretant of, this connection between Dicisign and

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in a certain language with a certain syntax and with a certain interpretations of its noun and verb phrases. Peirce's taking propositions to be Dicisigns immediately requires they are types which it should be possible to express in sinsigns with a certain double structure. Peirce, of course, differs in allowing for a far wider array of semiotic expression types than King's binding propositions to some language. Remarkable, however, is that King independently reaches certain results paralleled in Peirce's doctrine. Thus, King unknowingly reinvents Peircean "lines of identity" to represent the identification between different occurrences of the same variable in predicate logic expressions (42); even more interesting is King's insistence that at the deepest level, the syntactic combination relation R remains as yet undefined—as the very basis of all more specific syntactic relations. He vacillates between the possibilities of taking it as a primitive relation or taking it to be explained in terms of other, nonsyntactical concepts (presumably mental or neurological). Peirce's notion of "continuous predicates" (below) aims at essentially the same issue, the explanation of the fundamental syntax of co-localization—preferring instead the ontological explanation in terms of the continuity of real relations. King's relation R is equally fundamental as his hypothesis rests on the idea that the proposition "inherits" the relation R and its "instantiation function" (its ability to be saturated by suitably semantic entities) from the sentence embedded in the proposition. In Peircean lingo, this would mean that the colocalization syntax of the sinsign expressing the proposition is inherited by the structure of the proposition itself; again Peirce would prefer an ontological motivation (in the structure of facts) of the primitive syntax rather than a linguistic (or neuro-mental) one.

object must *also* be an object of the Dicisign. Bellucci: "Therefore, that which the interpretant represents—the secondness between the proposition and its object—is also represented by the proposition." (19). In order to achieve this, the Dicisign must have two parts—one representing the Object, and the other, . more surprisingly, representing a part of the Dicisign itself (namely its claim that it is connected to its object). The third step, then, analyzes these two parts. The first part is easy: it is the normal purported object reference of the Dicisign, called its Subject—now doubled to include also the object relation of the sign itself (cf. below on objects and meanings of Dicisigns). The other is the more complicated part: it will now have to "represent how the proposition itself represents the object" (Bellucci, 22). In a certain sense, it is the Dicisign's self-description relating in which way the Dicisign describes its object. For a first glance, the Dicisign says: 'Here is an object O, and it has the property P'; the *Syllabus* deduction now claims that this is only a shorthand, made possible by an underlying, more complicated structure which may be given the following colloquial paraphrase: 'Here is an object O, really connected to this sign, and this connection grants the truth of this sign's further claim that this predicate holds of that object: P'. So the surface predicate of the Dicisign is embedded in an implied, more complicated predicate describing the Dicisign itself.

As Bellucci remarks, Peirce's earlier description of the Dicisign—also in discarded sketches of the *Syllabus*—directly derives the double structure of the Dicisign from the double structure (object/property) of the facts depicted. Peirce then seems to prefer the more complicated argument because it presupposes less—the truth claim of the Dicisign only. You could add that the simpler argument does not address the syntactic and claim aspects of the Dicisign and thus also achieves less than the complicated deduction aims for.

This is how we should understand the difficult doctrine of the double object of Peircean Dicisigns—which paves the way for the relation between Dicisigns and facts.

3.8   Facts as Truth-makers of Dicisigns

"What we call a 'fact' is something having the structure of a proposition, but supposed to be an element of the very universe itself" ("Kaina Stoicheia", 1904, EPII 304), Peirce claims, and this fact theory is what explains the ability of propositions to depict facts. Facts are the truth-makers of Dicisigns—if a Dicisign is true, the corresponding fact is the case.

Thus, the fact depicted by the Dicisign is different from the object reference of the Dicisign.[23] This distinction allows for an obvious way of explaining the existence of false Dicisigns—something which may sometimes be a challenge for picture-oriented theories of the expression of propositions (cf. G.E. Moore; the early Russell). The syntax keeping together the Dicisign in itself functions as an index of the two aspects of the fact corresponding to the two aspects of the Dicisign: "Every informational sign thus involves a Fact, which is its Syntax" (*Syllabus*, 1903, EP II 282; 2.321). Peirce thus maintains a theory of facts or state-of-things to account for what was later called the truth-makers of propositions. Thus, he distinguishes the object or referent of the Dicisign—given by its indexical subject part, on the one hand—and the truth-maker making true the Dicisign as a truth-bearer—given by the fact structured in the same way as the syntax of the proposition. This plastic theory permits Peirce's account to escape problems encountered by proposition theories taking states-of-affairs or facts to be not only the truth-makers of propositions but also their referents. Such simpler doctrines immediately, of course, run into trouble because of their difficulty in accounting for false propositions.

But even theories admitting false propositions may encounter problems. False propositions refer to non-existing facts, but the same thing is achieved by meaningless propositions. The difference between propositions such as "Barack Obama is the president of China" and "The present king of France is bald" tend to evaporate in such a theory. Russell, as is well known, concluded that the latter—just like the former—must be counted as false. In Peirce's account, we should rather take the former proposition as a false claim about an existing person and the latter as a meaningless claim about a non-existing person because it fails to make an object reference for the proposition in the Universe of Discourse—even if both have non-existing truth-makers. (In the framework of bivalent logic, Peirce tended to count meaningless propositions as true, reserving "false" to refer to ascriptions of erroneous predicates to potentially existing entities only.)

Facts, in Peirce's doctrine, are certain simple states of things:

> "A *state of things* is an abstract constituent part of reality, of such a nature that a proposition is needed to represent it. There is but one *individual*, or completely determinate, state of things, namely, the all of reality. A *fact* is so highly a prescissively abstract state of things, that it can be wholly represented in a simple proposition, and the term "simple," here, has no absolute meaning, but is merely a comparative expression." ("The Basis of Pragmaticism in the Normative Sciences", EPII, 378, 5.549–50)

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[23] As already remarked by Hilpinen (1992).

Thus, simplicity here pertains to the relevant level of observation—not to any supposedly basic level of reality, such as was the case in Wittgenstein's in some respects similar picture theory of language in the *Tractatus* which famously led him to found his whole theory upon logical atoms without being able to point out a single example of one. Even if Peirce's theory of Dicisigns may, even in a very strong sense, be called a picture theory of propositions, it does not follow that the objects and properties singled out by a proposition be simple in any absolute sense. This is because states-of-things or facts in Peirce's account are *structures* of reality, distinct from simple subsets of reality:

> "... I must first point out the distinction between a Fact and what in other connexions, is often called an *Event** [Foot note* Or at least the temporal element of it is not the whole of it since [the] thing to which the event happens [is] an element of the event.], but which, owing to that word being used in the Doctrine of Chances in its stricter sense of the way in which a doubt about what *will* happen is ultimately resolved, must be here called an *Occurrence*. If from the Universe of the Actual we cut out in thought all that, between two instances of time, influences or involves in any considerable degree certain Existent Persons and Things, this Actual fragment of what exists and actually happens, so cut out, I call an Actual Occurrence which Thought analizes into Things and Happenings. It is necessarily Real; but it can never be known or even imagined in all its infinite detail. A *Fact*, on the other hand is so much of the Real Universe as can be represented in a Proposition, and instead of being, like an Occurrence, a *slice* of the Universe, it is rather to be compared to a chemical principle *extracted* therefrom by the power of Thought; and though it is, or may be, Real, yet in its Real Existence, it is inseparably combined with an infinite swarm of circumstances, which make no part of the Fact itself." (Ms. 647 "Definition", 5th draught 16-18 Feb. 1910, p. 8-11, discussing Laplace)

Thus, facts or states-of-things are "principles", structures extracted from reality—explaining their Janus-headed doubleness, consisting at the same time of particular objects (secondnesses, referred to by the indices of the proposition) and general properties (firstnesses; described by the icons of the proposition). Scientifically traceable causal relations hold between facts, *not* between occurrences.[24] Thus, Peirce's version of scientific realism (and scholastic realism, assuming the reality of some predicates) is dependent upon this ability of

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[24] Peirce continues: "It is impossible to thread our way through the Logical intricacies of Being unless we keep these two things, the *Occurrence*, and the *Real Fact*, separate in our

Dicisigns to depict extracted, structured aspects of reality. Here, the ability of Dicisigns to involve the large array of iconic predicate possibilities of maps, diagrams, graphs, etc., becomes central to his notion of diagrammatical reasoning in the sciences. The important claim above, that the simplicity of facts is relative only, gives an easy way of understanding why simple Dicisigns may express facts stemming from very different levels of ontology (from "$2 + 2 = 4$" to "There are two classes of elementary particles", "This chair is white" to "The Movement of Enlightenment took place in the 17th and 18th centuries") where the objects involved have highly different ontology and complexity, cf. on diagrams and language in ch. 7. This simplicity pertains to fact structure only, not to the objects and events co-constituting those facts.

3.9 The Relation of Dicisigns to Rhemes and Arguments

The systematic characterization of the Dicisign as compared to Rhemes and Arguments is a task to which Peirce returns over and over, with changing (but not necessarily contradictory) results in his deliberations concerning sign taxonomies in the decade after the turn of the century. One takes the idea of the Dicisign as the sign separately indicating its object as paradigm. Measured on this property, Rhemes are signs which lack such separate parts, while Arguments, on the other hand, are signs which add a further separate function, namely that of separately expressing its interpretant—the conclusion of the Argument, of course, fulfilling that function:

> "A representamen is either a *rhema*, a *proposition*, or an *argument*. An *argument* is a representamen which separately shows what interpretant it is intended to determine. A *proposition* is a represen-

Thoughts. John Stuart Mill did not do so; since he argues as if an *Occurrence* could have a *Cause*. In truth, both the *Cause* and its *Effect* are Facts, and no man will ever understand the subject of causation rightly until he sees that they are so. It is not, for example, the Motion of the Earth, as an Occurrence, that is caused by its momentum and by the gravitational attractions of the Sun and of the other bodies of the Solar System considered as Occurrences; for none of these things *are* Occurrences. It is the Fact of the motion of the Earth's centre of gravity of which one component is due to the Fact that it has not ceased to move with a certain velocity in a certain direction, while other components are due to the Facts that the various other bodies, by virtue of their several masses and the gravitating power that resides in every unit of mass, continually communicating, at the distances which they severally are from the Earth's center of gravity, several component accelerations, to its motion. Mill's not making the needful distinction between Facts and Occurrences drives him to the declaration that the complete cause of any happening is the aggregate of all its antecedents, a principle which, though it is a necessary result of his views, he utterly ignores from the moment of enunciating it; for the excellent reason that its recognition would eviscerate the conception of Cause of all utility." (ibid.)

tamen which is not an argument, but which separately indicates what object it is intended to represent. A *rhema* is a simple representation without such separate parts." ("The three normative sciences", "Lectures on Pragmatism", IV, 1903, EPII 204)

This idea may be expressed more simply in the beautiful (but maybe, for a first glance, more bewildering) definition:

"The second trichotomy of representamens is [divided] into: first, simple signs, substitutive signs, or *Sumisigns*; second, double signs, informational signs, quasi-propositions, or *Dicisigns*; third, triple signs, rationally persuasive signs, *arguments*, or *Suadisigns*." (*Syllabus* 1903, EPII, 275; 2.309)

Thus Rhemes-Dicisigns-Arguments are simple-double-triple signs, respectively. Peirce here introduces a different terminology, that of Sumisigns-Dicisigns-Suadisigns (on other occasions, he experiments with Seme-Pheme-Delome). These terminological neologisms are all intended to indicate the generalization of the concepts involved from the standard, linguistic-logic acceptance to the broader, semiotic interpretation indicating the intended exhaustive tripartition of *all* signs, following the generalization strategy for all basic trichotomies of Peirce's semiotics. The triple structure of the Argument refers to the idea that it not only is a sign for its object by means of the Rheme and the Dicisign presented in the premise, but also involves the same object a third time, now appearing as that to which the conclusion pertains.[25] This is obvious from yet another description of the same triad:

"Or we may say that a Rheme is a sign which is understood to represent its Object in its characters merely; that a Dicisign is a sign which is understood to represent its Object in respect to actual existence; and that an Argument is a sign which is understood to represent its Object in its character as sign." (*Syllabus* 1903, EPII, 292; 2.252)

Rhemes potentially refer to any object (or *n*-tuple of objects in case of polyadic Rhemes) displaying the character iconically presented in the rheme; in addition to that, Dicisigns indexically point out their object, and, again in addition to that, Arguments represent their object as signifying the conclusion.[26] This

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[25] Correlatively, Arguments add to the syntax of Dicisigns the higher-level syntax of deriving one Dicisign from the other in a way so that deriving is represented as lawful and general.

[26] Peirce sometimes speaks as if all Dicisigns refer to actual existence: "Thus every kind of proposition is either meaningless or has a real Secondness as its object. This is a fact

may easily give the idea close to the received one, that the relation between the three is compositional, so that Dicisigns are constructed from Rhemes, while Arguments are constructed from Dicisigns. Peirce's redefinition, however, goes against such simple compositionality:

"It is only the terminology, and the extension of the division to *all* signs, (with the consequent necessary modifications,) that is not to be found in every treatise on Logic. Every such book tells about the triplet, *Term, Proposition, Argument*; but not every book makes it quite clear what it is that there is a division of. If we are to say that it is a division of all signs, we shall have to change the definitions of the three classes, not to their very bottom, but superficially, and so much that precision demands that new terms should be substituted for 'term', 'proposition', and 'argument'. (...) Now until I constructed the System of Existential Graphs, and for longer after than it would be agreeable to me to confess, I never so much as dreamed of there being any fault to be found with the doctrine of the books which goes back to the time of *Abelard*, and without doubt much earlier, that a Syllogism is composed of three Propositions, and a Proposition of two Terms. But after this system had been constructed, and after I had found by experience that its teachings are trustworthy, it one day attracted my notice that this system represents the relations of Terms, Propositions, and Arguments quite differently. The exposition of this can wait until the Reader is in possession of the system. I will now only say that, while this system does present Semes, yet it would not be incorrect to say that everything scribed according to this system, down to its smallest parts, is a Pheme, and is not only a Pheme, but is a Proposition. Delomes (dee'loamz) also are brought to view. Yet no Delome (dee'loam) is ever on the diagram, A Graph in this system is a type which expresses a single proposition. Without just now troubling you with an adequate description of the Delome (dee'loam), I may point out that it represents no statical determi-

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that every reader of philosophy should constantly bear in mind, translating every abstractly expressed proposition into its precise meaning in reference to an individual experience." (*Syllabus* 1903, EPII, 276, 2.315)

Such simple Dicisigns form the core of his doctrine, and from this center, Dicisigns more remote from actual existence may be defined, such as ordinary universal propositions not involving existence ("All Englishmen are gentlemen"), propositions referring to fictional universes ("Donald Duck wears a sailor's sweater"), modal propositions, imperatives, interrogatives, requiring each their set of logical rules:

nation of thought but a process of change from one state of belief to another." ("πλ", 1906, Ms. 295, alternate version 26ff)

Peirce here uses Seme-Pheme-Delome for Rheme-Dicisign-Argument. His argument is built on how Existential Graphs represent propositions (see ch. 8), but it has a broader scope. The upshot is that every part of the formalism, from the smallest to the largest graph, is a Dicisign, simple or complex, and in a certain sense any part of a Dicisign is already a Dicisign. Such a claim may appear strange, as linguistically expressed Dicisigns may not have parts in the sense mentioned; it is easier to apply to Dicisigns with continuously articulated predicates such as pictures or diagrams—any part of such a predicate is still a predicate (up to coarse-graining), and a Dicisign using such a predicate consequently allows for Dicisign parts: a part of a map is also a map, albeit of a smaller domain. Arguments, by contrast, are movements from one Dicisign to another, cf. the central idea of reasoning as experimenting and manipulating with diagrams. Such experimenting, of course, may be charted in a higher-level diagram along another dimension, but not on the same level of Dicisign representation. Thus, Dicisigns are not built from Rhemes, and Arguments not from Dicisigns—even if they do contain them. Their relation should rather be described by continuity, cf. the metaphor from kinematics:

> "But in the last sense, which alone is the essential one, an Argument is no more built up of Propositions than a motion is built up of positions. So to regard it is to neglect the very essence of it. (...) ...Positions are either vaguely described states of motion of small range, or else (what is the better view,) are *entia rationis* (i.e. fictions recognized to be fictions, and thus no longer fictions) invented for the purposes of clear descriptions of states of motion; so likewise, Thought (I am not talking Psychology, but Logic, or the essence of Semiotics) cannot, from the nature of it, be at rest, or be anything but inferential process; and propositions are either roughly described states of thought-motion, or are artificial creations intended to render the description of thought-motion possible; and Names are creations of a second order in service to render the representation of propositions possible. An Argument may be defined as a Sign which intends itself to be understood as fulfilling its function." ("πλ", 1906, Ms. 295, 102)

Thus, the reasoning process as such is taken as primitive in the sense that arguments form the basis and frame for the description of the machinery that makes it possible. Dicisigns, then, are tools for the description of phases of reasoning—we may add: tools for making explicit propositions with the aim

of conducting arguments.[27] Thus both Rhemes and Dicisigns may be seen as potential or truncated Arguments rather than autonomous figures:

> "I have maintained since 1867 that there is but one primary and fundamental logical relation, that of illation, expressed by *ergo*. A proposition, for me, is but an argumentation divested of the assertoriness of its premiss and conclusion. This makes every proposition a conditional proposition at bottom. In like manner a "term," or class-name, is for me nothing but a proposition with its indices or subjects left blank, or indefinite." ("The Regenerated Logic", 1896, 3.440)

This has the important corollary that all propositions are equivalent to conditionals. All universally quantified propositions are equivalent to conditionals (All humans are mortal $\Rightarrow$ If x is a human, then x is mortal)—existentially quantified propositions are similarly instantiated conditionals: (Socrates is mortal $\Rightarrow$ If there is an x such that the x is Socrates, then x is mortal).[28] All such a conditional lacks in order to be an argument is the assertion of the premise and the assertion that the conclusion follows. Thus Peirce can say that a proposition is an argument deprived of its assertiveness (*Syllabus*, 1903, 2.344), just like a Rheme is a proposition deprived of its subject (or its predicate). So, all three parts of the Rheme-Dicisign-Argument distinction are conceived of functionally, in their relation to the ongoing chain of inference.

This has the corollary that the Rheme-Dicisign-Argument relation is not that of compositionality. Even if Rhemes can be derived from Dicisigns and Dicisigns from Arguments, and even if the Dicisign requires the involvement of (at least) two Rhemes and the Argument that of (at least) two Dicisigns, it would be erroneous to say the Dicisign is composed from two Rhemes and the Argument from two Dicisigns. This is because the syntaxes of Dicisigns and Arguments, again, are taken to be *continuous* so that both Dicisign and Argument may be parsed in different ways and with different reinterpretations of their constituents. This continuity, granting the unities of the functions of Dicisigns and Arguments, respectively, is the basic level of which the functional parts form but aspects—cf. the idea that any genuine part of a Dicisign must be, in itself, a Dicisign.

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[27] Taking the chain of reasoning as primitive may give a new idea of biological sign evolution. Instead of assuming simple organisms use very simple signs which then compose to more complex sign during evoution, we can assume that simple organisms use unarticulated, implicit arguments so that semiotic sophistication during evoution rather has the character of the ongoing articulating and making explicit the semiotic machinery, such as the two functions of Dicisigns, cf. ch. 6.

[28] Cf. Goudge 1950, 249.

3.10 "Collateral Information" and the Interpretability of the S-P Distinction

Sometimes, Peirce takes the reference frame of propositions to be simply all of reality—not unlike the Frege-Russell tradition—but at other times he takes care to underline that propositions may refer to selected subsets of that reality only, agreed upon by the communication partners—or even to fictitious universes (which could be said also to exist, in another sense, as peculiar subsets of reality). This relation of propositions to a selected Universe of Discourse is important for several reasons. One is the relativity of indexical reference to such universes, making much sign use dependent upon the implicit knowledge about the objects indicated by the proposition—the issue of what Peirce calls "collateral information". Another is that the exact borderline between reference and description in a proposition is also open to interpretation and may, with the same proposition, vary from one use to the next. Finally, a consequence underlined by Jaakko Hintikka is that the truth of the proposition becomes relative to the Universe of Discourse discussed—which makes possible a plurality of representations of the same objects and, consequently, avoids the ineffability of truth which is often the implication of accepting a one-to-one reference of logic to one universe only.

We already touched upon the role of collateral knowledge discussing the indexical half of the proposition. The issue is not, however, marginal in Peirce's doctrine. Quite on the contrary, no subject of a Dicisign is identifiable at all without some collateral information about the relevant object referred to:

> "I think by this time you must understand what I mean when I say that no sign can be understood—or at least that no *proposition* can be understood—unless the interpreter has 'collateral acquaintance' with every Object of it." (Draft of a Letter to William James, February 26th 1909, EPII 496, 8.183)

The idea is that propositions never occur as isolated entities but form part of ongoing processes of inference, and in order to assume their place in such processes, they must refer to objects already introduced earlier in the reasoning process:

> "At this point it must be noticed that the simplest assertion uses two signs. This is true even of so simple a proposition as 'pluit', where one of the signs is the totality of the circumstances of the interview between the interlocutors, which makes the auditor think that what is happening out of doors is referred to. This is evident,

since if he simply heard the word 'pluit' pronounced, though he might be ever so determined to believe what was meant, yet if he knew not at all whence the sound came, whether from somebody recounting a dream or telling a story or from a planet of a distant star, and did not know at what time the word was uttered, he could not in the least guess what he was expected to believe. Nor could any mere *words* tell him, unless they referred to something in his immediate experience, as a sign (and if he were, for example, told that the rain was 'fifty miles north of *where you are standing.*') It must be something common to the experience of both interlocutors." ("Basis of Pragmatism", 1905, Ms. 284, 42-3)

The very role of the index part of the proposition is not only to point out an object—this involves also connecting it to existent objects and reference frames. This does not mean, of course, that no new objects may ever appear— only that their appearance is possible only with reference to the framework of already known objects. This comes from Peirce's unvarying, Kantian insistence that existence is no predicate; that is, no amount of descriptive machinery will ever be sufficient uniquely to indicate an existing object or event:

"...every correlate of an existential relation is a single object which may be indefinite, or may be distributed; (...) that is, may be chosen from a class by the interpreter of the assertion of which the relation or relationship is the predicate, or may be designated by a proper name, but in itself, though in some guise or under some mask, it can always be perceived, yet never can it be unmistakably identified by any sign whatever, without collateral observation. Far less can it be defined. It is *existent,* in that its being does not consist in any *qualities,* but in its effects—in its actually acting and being acted on, so long as this action and suffering endures. Those who experience its effects perceive and know it in that action; and just that constitutes its very being. It is not in perceiving its qualities that they know it, but in hefting its insistency then and there, which Duns called its *haecceitas*—or, if he didn't, it was this that he was groping after." ("Some Amazing Mazes, Fourth Curiosity", c. 1909, 6.318)

A recurrent example taken by Peirce is the assertion of the proposition that a house is burning. If a person hears this claim, he will not scrutinize world history and the geography of the globe in order to sum up all examples of burning houses to find the right one; he will, as the first thing, look around

in order to discover the burning house in the immediate vicinity of the here-and-now of the communication partners. Acting thus is, of course, following elementary communication maxims later charted by Grice recommending information given to be relevant. But Peirce's idea is even more basic: if no possibility of locating the reference of the index part of the Dicisign is at hand, it simply does not convey any information as such:

> "All that part of the understanding of the Sign which the Interpreting Mind has needed collateral observation for is outside the Interpretant. I do not mean by 'collateral observation' acquaintance with the system of signs. What is so gathered is *not* COLLATERAL. It is on the contrary the prerequisite for getting any idea signified by the sign. But by collateral observation, I mean previous acquaintance with what the sign denotes." (Review of Lady Welby, 1903 8.179)

On the other hand, given the presence of collateral information, even subtle aspects of the predicative part of the proposition may perform the indexical function to a sufficient degree for information to be conveyed. This is why a simple photograph may function as a full-fledged proposition, given the right amount of collateral information. If I see a photo of President Obama as a young man, easily recognizable by the features of his face, smoking a cigarette, I am in a position to retrieve the propositional information that Obama has been smoking. I might not be able to see what he smoked (or whether he inhaled)—if I do not possess the collateral information making me able to identify the brand of cigarettes. Thus, much visual communication is able—as against often-heard claims that pictures are not able to make statements—to state propositions, provided the relevant collateral information is accessible to the receiver. And to Peirce's Dicisign doctrine, this is no special feature for images or anything of the kind, because even the most formalized, scientific proposition is only understandable given a relevant amount of collateral information—which is part of the reason why proofs using mathematical formulae need accompanying information in ordinary language. This aspect of the Dicisign doctrine is connected, of course, to Peirce's ontology of epistemology: his view of the reasoning process as a continuous whole, having begun long before man and continuing into an indefinite future: the single proposition is only really understandable in its context of this ongoing process (see below). Thus, it is possible to communicate surprising Dicisigns by means of pictures alone. Take a constructed example: you find in your mailbox an envelope containing nothing but a photograph of yourself, easily recognizable, in an embarrassing, sexual situation. This is sufficient to convey the propositional information that

somebody has caught you in that situation, is able to prove it, and intends you to share that knowledge—most probably wishing to blackmail you and pressure you to subject to some demands not expressed in the sign (like all Dicisigns, of course, such a sign may be false and rely upon photo manipulation). So the proposition "X took part in such-and-such erotic scenes" forms the core of the speech act of a threat (or should we call it a picture act, no language being involved at-all as yet). Maybe you even faintly suspect who the sender may be and what the intended *quid pro quo* might amount to. An empirical example of such a sign has recently appeared in the context of the so-called Ergenekon scandal where the Turkish islamist government allegedly tried to compromise some of its secularist opponents by the use of such videotaped pictures:[29]
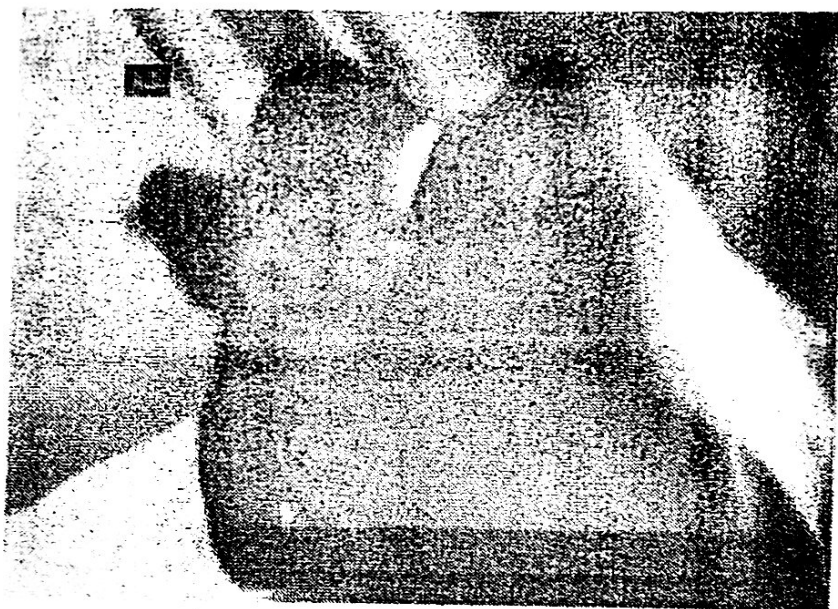

Figure 3.1: Screenshot from Turkish blackmail video

You may say such collateral information belongs to the pragmatics of proposition utterances rather than to the study of propositions themselves. In Peirce's Dicisign doctrine, however, no such distinction prevails because of the close connection between the index part of any proposition and the relevant collateral knowledge. The index part is simply there in order to activate that knowledge—if it does not succeed, the sign will not be able to function as a Dicisign at all.

The possibility of Dicisigns with no explicit articulation of the parts responsible for each of its two basic semiotic functions—as in the photograph

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[29] Here reproduced from a screenshot of "The Daily Beast"—www.thedailybeast.com, 27 May 2011.

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case—has the corollary that the distinction between these two functions may vary with context, even pertaining to exactly the same Dicisign: If the same photograph as just discussed were sent to another identifiable participant in the orgy depicted, it would function, in the same way, as a threat—but now based on the singling out the depiction of this other person as the relevant index in the photography instead of yourself. And, again, if the very same photograph was sent to a third party, e.g., an expert on pornography, he might take as the relevant object the present ocurrence of rare erotic practices there displayed while the individual identity of the participants may lose relevance. But reinterpretability not only pertains to the primary object of the sign—also to the secondary or immediate object of the sign. Take again the Louis XIV painting—to some observers, the special smile may be that piece of collateral knowledge enabling to abductively identify the subject as that French king; to other observers it may be the special wig playing the role of immediate object identifying the subject; both of them features which may, in other cases be taken as part of the predicative, descriptive side of the Dicisign. This relativity or indeterminacy in the precise delimitation of the subject/predicate aspects of the Dicisign is remarked upon by Hilpinen (476), observing the crucial fact that this idea takes Peirce's analysis far away from the logical atomism of Russell or Wittgenstein,[30] claiming that only one correct parsing of a proposition exists. Even if the distinction between subject and predicate remains indispensable for the Dicisign and thus *must* be drawn somewhere in each single usage, the context may decide where the exact dividing line goes in each single case:

> "The interpretant of a proposition is its predicate; its object is the things denoted by its subject or subjects (including its grammatical objects, direct and indirect, etc.). Take the proposition "Burnt child shuns fire." Its predicate might be regarded as all that is expressed, or as 'has either not been burned or shuns fire', or 'has not been burned', or 'shuns fire', or 'shuns', or 'is true'; nor is this enumeration exhaustive. But where shall the line be most truly drawn? I reply that the purpose of this sentence being understood to be to communicate information, anything belongs to the interpretant that describes the quality or character of the fact, anything to the object that, without doing that, distinguishes this fact from others like it; ..." ("Pragmatism", 1907 5.473)

This implies that the reinterpretability of the S-P distinction may go as far as inverting completely the two functions in the same sign. The painting (P)

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[30] Russell (1903) mentions that a sentence may be analyzed in subject/assertion in as many was as it has subjects (44), but this is a far cry from the plasticity of Peirce's conception.

with a legend (S) was Peirce's staple example of a proposition—but given the relevant collateral knowledge, the two functions may be inverted. Take the improbable situation of a person which is well acquainted with the visual appearance of Louis XIV but never learned about his name or position. To such a person, the painted canvas may function as a subject—distinguisting its object from others like it—while the name tag "Louis XIV" would be the new, predicative information, describing his name and royal status (the painting-with-legend thus functioning, as a whole, as a Dicent Indexical Legisign, cf. our discussion below).[31]

Both of these issues—the need for collateral information and the reinterpretability of the S-P distinction—are connected to the central issue in Peircean logic that the reference of a Dicisign is taken to be relative to a selected universe of discourse—a model—consisting of a delimited set of objects and a delimited set of predicates, agreed upon by the reasoners or communicating parties, often only implicitly so.[32]

The radicality of the plasticity inherent in the reinterpretability of Dicisigns becomes obvious when Peirce attempts the opposite move of his standard anal-

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[31] Of course, this invertibility comes from the fact that the character of the name, apart from its indication function, also belongs to the predicate: "There is an x with the name $N(x)$ and the visual appearance $P(x)$", cf. the idea of throwing everything into the predicate. The indexical relation between x and the name N is then presupposed in Peirce's early version of rigid designation, cf. above. The Immediate Object granting the indexical subject-object connection always also has iconical qualities.

[32] Reinterpretability and plasticity of the Universe of Discourse is taken to be central in Hintikka's generalization of the distinction between the algebraists' logic as a reinterpretable calculus and the Fregeans' logic as a universal language. This distinction, Hintikka sees as constitutitve to 20 C philosophy as such. In logic, he finds it in the algebraic tradition from Boole through Peirce to Schröder to Löwenheim, to Carnap and model theory (and to himself) versus the more well-known Frege-Peano-Russell-Wittgenstein tradition. More generally, in philosophy, the calculus tradition will be found in figures like Husserl or Cassirer focusing upon the plurality of phenomenological and semiotic means to express the same propositions—while the universal medium tradition will unite Russell, early Wittgenstein and Quine with continental philosophers like Heidegger and Derrida, all agreeing upon the ineffability of truth and impossibility of translation. In Peirce's doctrine of Dicisigns, the plurality of representations is evident in the fact that the same objects may be addressed using different semiotic tools, highlighting different aspects of them. To Hintikka, these virtues of the calculus tradition also imply that the ineffability of truth of the universal-medium tradition evaporates. If you accept only one language, the question of the relation of this language to its object cannot be posed outside of this language—and truth becomes ineffable. If several different, parallel approaches to the same object are possible, you can discuss the properties of one language in another, and you may use the results of one semiotic tool to criticize or complement those of another. Even taking logic itself as the object, Peirce famously did this, developing several different logic formalisms (most notably the Algebra of Logic and the Existential Graphs), unproblematically discussing the pro and cons of these different representation systems.

ysis: throwing as much of it as possible into the subjects instead of the predicate. In the fall of 1908 he develops this idea, developing a concept of as stripped-off a predicate as possible, the so-called "continuous predicate":

> "1908 Oct 18
>
> The second remark about the subject of an assertion is that more or fewer objects may be regarded as subjects while the remainder of the assertion is the predicate. Moreover instead of regarding the subjects are plural one may regard the whole set as forming the *Collective Dynamical Subject*. The *Complete* Collective Dynamical subject includes *all* that is necessary to be acquainted with in order to understand the assertion, excepting the forms of connection between the different Single Subjects. Thus in the assertion "Every catholic adores some woman," the complete subject embraces 1. the character of being catholic, 2. the character of the relation of adoring, 3. the character of being a woman; and the proposition is that, the character of being catholic determines anything to be in the relation of adoring to something having the character of a woman." (Ms. 339, "Logic Notebook")

Speaking about collateral knowledge, Peirce observed that it is not only the referent objects which the Dicisign reader needs preliminary knowledge about—that also goes for the characters and types of relations involved in the predicate. Now, Peirce constructs the structure of all subjects of a proposition, calling it the "Complete Collective Dynamical Subject" or "Subject-System"—involving all aspects of the predicate which requires collateral knowledge beforehand. Already Murphey pointed to the following quotation, but since then only few scholars have investigated this idea (see Pietarinen 2006a; Bellucci 2013a):

> "...I mean by the Subject (capitalized) of an assertion or question not the name or description so called by the grammarians, but that which is named, described, or referred to, to which the predicate relates. In the second place, the grammarians usually limit the term to the subject nominative, while I term anything named in the assertion a Subject, and although I do not always express myself so accurately, I regard everything to which the assertion relates and to which reference can be removed from the predicate, although what is referred to be a quality, relation, state of things, etc., as a Subject. Thus one assertion may have any number of Subjects. Thus, in the assertion 'Some roses are red,' i.e. possess the color redness, the

color redness is one of the Subjects; but I do not make 'possession' a Subject, as if the assertion were 'Some roses are in the relation of possession to redness,' because this would not remove relation from the predicate, since the words 'are in' are here equivalent to 'are subjects of,' that is, are related to the relation of possession of redness. For to be in a relation to X, and to be in a relation to a relation to X, mean the same thing. If therefore I were to put 'relation' into the subject at all, I ought in consistency to put it infinitely many times, and indeed, this would not be sufficient. It is like a continuous line: no matter what one cuts off from it a line remains. So I do not attempt to regard 'A is B' as meaning 'A is identical with something that is B.' I call 'is in the relation to' and 'is identical with' Continuous Relations, and I leave such in the Predicate. The Predicate is that part of the assertion which is signified as the logical connexion between the Subjects. But I sometimes term the whole set of Subjects the Subject-System." ("Common Ground", Ms. 611, 1908; Murphey (1961), 317-318)

Translating characters of the predicate to second-order objects by means of hypostatic abstraction ("is red $\Rightarrow$ possesses redness"), the total number of subjects in the proposition (and the valency of the predicate) increases correspondingly. In a letter to Lady Welby, a dyadic example is picked to illustrate what is left of the predicate when such an abstraction process is completed:

"When we have analyzed a proposition so as to throw into the subject everything that can be removed from the predicate, all that it remains for the predicate to represent is the form of connection between the different subjects as expressed in the propositional *form*. What I mean by 'everything that can be removed from the predicate' is best explained by giving an example of something not so removable. But first take something removable. 'Cain kills Abel.' Here the predicate appears as '___ kills ___.' But we can remove killing from the predicate and make the latter '— stands in the relation ___ to ___.' Suppose we attempt to remove more from the predicate and put the last into the form '___ exercises the function of relate of the relation ___ to ___' and then putting 'the function of relate to the relation' into another subject [to] leave as predicate '___ exercises ___ in respect to ___ to ___.' But this 'exercises' expresses 'exercises the function'. Nay more, it expresses 'exercises the function of relate', so that we find that though we

may put this into a separate subject, it continues in the predicate just the same. Stating this in another form, to say that 'A is in the relation R to B' is to say that A is in a certain relation to R. Let us separate this out thus: 'A is in the relation R^1 (where R^1 is the relation of a relate to the relation of which it is the relate) to R to B'. But A is here said to be in a certain relation to the relation R^1. So that we can express the same fact by saying, 'A is in the relation R^1 to the relation R^1 to the relation R to B', and so on *ad infinitum*. A predicate which can thus be analyzed into parts all homogeneous with the whole I call a *continuous predicate*. It is very important in logical analysis, because a continuous predicate obviously cannot be a *compound* except of continuous predicates, and thus when we have carried analysis so far as to leave only a continuous predicate, we have carried it to its ultimate elements." ("Letters to Lady Welby" (14 December 1908), Peirce (1966) 396–397; the 'to' in brackets seems to be missing in the text)

What is left is the pure, relational structure of the predicate. Why does Peirce pick the term "continuous predicate" for this relational structure? His idea is connected to the often-quoted quip "Nota notae est nota rei ipsius"—the predicate of a predicate is a predicate of the thing itself. In the article "Nota Notae" in *Baldwin's Dictionary*, Peirce traces the wording to Kant and Wolff; the idea itself to Aristotle's Categories. In the context of polyadic predicates—relations—the *Nota Notae* of course implies that the relation of a relation to a thing is a relation to the thing itself. Just like the original idea, this may be repeated so that a connection of any number of relational steps from an object is, in itself, a relation to the object, cf. the quote above. So the *Nota Notae* grants there is an end to this cleansing process of all relational predicates. When reached, all the extra-relational semantics of the predicate is thrown into an enlarged Subject category, now comprising not only objects, but also reified aspects of relations, more or less general. Why is this purely relational predicate, left after the process, called "continuous"? This is because the *Nota Notae* identifies a multitude of connected relations with one relation—just like a multiplum of connected continuous line segments constitutes another continuous line segment. Thus, Peirce conceives of relatedness as such as essentially continuous. What remains of the predicate, then, is merely the structure of relations (which, cf. the reduction theorem, may again be analyzed as a composition of relations with valencies no higher than three). Bellucci (2013a) argues that the continuous predicate is, in the final analysis, what keeps the proposition together and grants its unity. In that sense, throwing all having to do with collateral knowledge into the subject system reveals that the struc-

ture left in the predicate is really what keeps the proposition together: the relational structure is what connects the subjects and the nonlogical parts of the predicate. Already Murphey, in his comments, saw the deep connection between this result and Peirce's metaphysical continuism—the idea that identity, co-existence, and relation are "continuous predicates" provides the deepest key to logical form. In Peirce's Existential Graphs, this continuity appears in both the blank Sheet of Assertion representing the relevant Universe of Discourse and in the notation known as the Line of Identity. This, then, is why co-localization comes naturally as the EG notation for conjunction: belonging to the same continuum is an obvious icon for logical conjunction.[33] This throws a light on Pietarinen's important observation that the Line of Identity notation reunites, in fact, the four functions of the copula triumphantly distinguished in the Fregean tradition: identity, predication, existence, and class inclusion: the convention of Lines of Identity fulfills all of these functions in the formalism; the outer end of the Line representing Existential Quantification, the continuity of the Line representing identity between differently named objects; the labeled Line of Identity represents the structure of the predicate, the hooks at its end points the unsaturated slots facilitating saturation by subject indices or class names. Thus, Peirce's argument—not knowing about Frege's and Russell's dissociation of them—goes to show the deep interrelation of the four. As Bellucci (2013a) remarks, this forms an important solution as to the "glue" of structured propositions, different from (but close to) Frege's complete arguments/incomplete functions solution, different from Russell's various solutions with judgment or logical form as unifying functions, different from Wittgenstein's ineffable logical form solution.

In the context of the reinterpretability of Dicisigns, the cleansing of predicates for all collateral knowledge shows the extreme plasticity of that notion. In certain contexts, all except for one subject variable may be thrown into the predicate (x as the subject saturating the predicate "___ killed Abel", as when asking the Biblical question of "Who killed Abel?"); at the other extreme, the subject-system of Cain, Killing and Abel saturates the predicate of "___ stand in the relation of ___ to ___", effectively throwing as much as possible into the Subject-System.

We said above that Peirce did not offer an analysis of predicates. As is evident from the doctrine of "continuous predicates" this is not completely true—

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[33] Before constructing the Existential Graphs, Peirce toyed with a dual variant called Entitative Graphs, in which co-localization represented disjunction, while the outer end of the Identity Line represented Universal Quantification. He gave up that notation and switched to its dual exactly for iconicity reasons: it seemed more natural that the single end point of a line represented Existential than Universal Quantification, just like the continuous connection more naturally represented conjunction.

the idea of "continuous predicates" is an attempt at distinguishing in predicates that which is analyzable (their relational structure), and that which is not (the closer semantical character of the relation). In the PAP (Ms. 293, 1906), Peirce also took "killing" as an example of a predicate which does not permit a thoroughly rational analysis. What is diagrammatizable—translatable into spatial structure—of the predicate is, also in Peirce's own EG's, the relational structure with specified subject slots. The semantic, nonlogical surplus of the predicate may then—if needed—be thrown into the "Subject-System". This plasticity of reinterpretation becomes important in order to understand the function of non-linguistic predicates like diagrams, pictures, and gestures, in Dicisigns, cf. ch. 7 below.

3.11   Two Arguments for the Unity of Propositions

Peirce thus seems to present two different accounts for the logical form granting the unity of propositions. One is the deduction of the double structure from the proposition's truth claim in the 1903 *Syllabus*; the other is the 1908 argument from continuous predicates for the unity of the relational predicate. The first one centers upon the proposition as truth claim lending itself to assertion; the second centers upon the unity of what is claimed in the predicate. How, if at all, do these two arguments relate? Bellucci, in his two detailed papers (2013a; in prep.) address each of the two separately, but seems to assume, without further notice, that they go together.

They certainly differ. The first argument is centered upon the predicate part being primarily an icon of the Dicisign itself—only secondarily containing a traditional predicate characterizing the object(s) referred to. This argument takes as its starting point the capacity of Dicisigns to have truth values and presupposes the principle of throwing the whole analysis of the Dicisign, including its claim aspect, into the predicate. The second is centered upon the predicate part as depicting possible object relations outside of the sign—not at all addressing the Dicisign's icon of itself which played center stage in the first argument. The second argument takes as its starting point the predicate as interrelating different semantic contents along with objects—hardly mentioning its truth claim—and presupposes the abstraction of all non-logical content *away* from the predicate, throwing it into the subject.

In a nutshell, the first argument focuses upon the predicate as an icon of the Dicisign itself, the second upon the predicate as an icon of object characteristics. These two unities are thus not the same. The first pertains to the semiotics of signs capable of truth claims; the second of the ontology of relations. This may give us a key to the relationship between the two: the latter

pertains to relations as such - whether they are depicted in the Dicisign or not. In this sense, the unity of "Cain killed Abel" lies in the continuous predicate of "X stands in the relation of Y to Z"—the fact it is possible at all for entities to entertain triadic relationships. It is, so to speak, the *fundamentum in re* of relational logic. It would hold even if there were nobody around to assert Dicisigns. It is what grants the possibility of there being references for polyadic predicates. The first argument addresses the conditions of possibility of there being truth-claiming signs. Unlike the second argument, then, it presupposes the existence of such signs. Through the intricate *Syllabus* argument, the double structure of the Dicisign was developed, seeing the predicate as primarily a claim about the referring and depicting abilities of the sign itself. Here, the predicate as depicting the object is merely a corollary of Dicisign structure. But the Dicisign could not be true if it was not somehow the case that the relational structure of its predicate really was able to depict existing relations represented. So, the existence of the Dicisign presupposes relational realism, to put it shortly. The converse does not seem to hold. So, the two arguments actually seem to be independent—but both of them are necessary for Peirce's account for the unity of propositions. The realism of continuous predicates is necessary for the possibility of there being real relations, and so for polyadic predicates to apply; the double structure, syntax and truth claim are necessary for there being Dicisigns. One establishes the unity of polyadic predicates; the other the saturated, claim-making use of them in Dicisigns.

3.12 Types of Dicisigns

Not only is the span of predicate types extremely wide in Peircean Dicisigns, they also come in widely differing degrees of generality. In Peirce's 1903 ten-sign classification (resulting from the combination of his three basic trichotomies), no less than three types are Dicisigns.[34] Let us quote his three

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[34]A basic idea in Peirce's mature semiotics is that each basic trichotomy is exhaustive, so that any sign is either a qualisign/sinsign/legisign, just like it is an icon/index/symbol and a rheme/dicisign/argument. From this principle follows that the three combine. Of the 27 resulting possible combinations, only 10 are deemed realizable because a higher sign from a higher trichotomy does not combine with a lower sign from a lower trichotomy. Peirce gave two different versions of this list. The standard list occurs in the *Syllabus* 1903 (EPII, 294-5):

1. Qualisign
2. Iconic Sinsign
3. Rhematic Indexical Sinsign
4. Dicent Sinsign
5. Iconic Legisign
6. Rhematic Indexical Legisign

descriptions of those signs (the square brackets are insertions by the CP editors citing Peirce's own examples).

> "Fourth: A Dicent Sinsign [*e.g.*, a weathercock] is any object of direct experience, in so far as it is a sign, and, as such, affords information concerning its Object. This it can only do by being really affected by its Object; so that it is necessarily an Index. The only information it can afford is of actual fact. Such a Sign must involve an Iconic Sinsign to embody the information and a Rhematic Indexical Sinsign to indicate the Object to which the information refers. But the mode of combination, or *Syntax,* of these two must also be significant." (*Syllabus* 1903, EP II, 294; 2.257)

> "Seventh: A Dicent Indexical Legisign [*e.g.*, a street cry] is any general type or law, however established, which requires each instance of it to be really affected by its Object in such a manner as

7. Dicent Indexical Legisign
8. Rhematic Symbol— Symbolic Rheme
9. Dicent Symbol—Proposition
10. Argument

Another version appears in the letter to Lady Welby Oct 12 1904 (8.341):

1. Qualisigns
2. Iconic Sinsigns
3. Iconic Legisigns
4. *Vestiges,* or Rhematic Indexical Sinsigns
5. *Proper Names,* or Rhematic Indexical Legisigns
6. Rhematic Symbols
7. Dicent Sinsigns (as a portrait with a legend)–
8. Dicent Indexical Legisigns
9. *Propositions,* or Dicent Symbols
10. Arguments.

Here, the sequence 3 to 8 has been changed. In 1903, the list takes the quali-sin-legisign sequence as fundamental, so that the priority of the three trichotomies is 1-2-3; in 1904 the overall structure follows the Rheme-Dicisign-Argument sequence, so the priority is rather 3-2-1. No argument is given for the change, but the implicit reason must be taken to be that the function of signs in reasoning (given by Rheme-Dicisign-argument) is decisive. This naturally groups Dicisigns together (7-10) while the no less than six Rhemes—fragmentary, unsaturated signs—make up the first six types of the list. The 1904 list also has the merit that legisigns are preceded by their sinsign replicas pairwise (2-3, 4-5, 7-8). It is remarkable that none of the two lists chooses the most well-known, second trichotomy of icon-index-symbol as its organizing principle. The 1908 version of the triangle depicting the ten combined signs (from the Dec 24 letter to Lady Welby, EPII, 491) is a mirror version of that of the *Syllabus,* now with Arguments in the upper left corner, maybe indicating that the corresponding list should now begin with the *most* complicated (or complete) sign type, that of the Argument, effectively inverting one of the lists given.

to furnish definite information concerning that Object. It must involve an Iconic Legisign to signify the information and a Rhematic Indexical Legisign to denote the subject of that information. Each Replica of it will be a Dicent Sinsign of a peculiar kind." (*Syllabus*, 1903, EP II 294, 2.260)

"Ninth: A Dicent Symbol, or ordinary Proposition, is a sign connected with its object by an association of general ideas, and acting like a Rhematic Symbol, except that its intended interpretant represents the Dicent Symbol as being, in respect to what it signifies, really affected by its Object, so that the existence or law which it calls to mind must be actually connected with the indicated Object. Thus, the intended Interpretant looks upon the Dicent Symbol as a Dicent Indexical Legisign; and if it be true, it does partake of this nature, although this does not represent its whole nature. Like the Rhematic Symbol, it is necessarily a Legisign. Like the Dicent Sinsign it is composite inasmuch as it necessarily involves a Rhematic Symbol (and thus is for its Interpretant an Iconic Legisign) to express its information and a Rhematic Indexical Legisign to indicate the subject of that information. But its Syntax of these is significant. The Replica of the Dicent Symbol is a Dicent Sinsign of a peculiar kind. This is easily seen to be true when the information the Dicent Symbol conveys is of actual fact. When that information is of a real law, it is not true in the same fullness. For a Dicent Sinsign cannot convey information of law. It is, therefore, true of the Replica of such a Dicent Symbol only in so far as the law has its being in instances." (*Syllabus* 1903, EP II 295, 2.262)

The Dicent symbol, of course, is Peirce's version of ordinary propositions involving predicates expressing general ideas, such as linguistic adjectives, verbs, common nouns, etc. But language is not the only source of such predicates. A wider array of icons may have general qualities, most conspicuously in their function as diagrams. Thus, a diagram with a label— say, a geometrical figure with a legend—may express a Dicent symbol, a full-fledged proposition, and the manipulation of that diagram, in turn, may express an Argument. The same goes for many types of maps, scientific diagrams and illustrations, tables, graphs. The obvious contrast category here, of course, is that of Dicent Sinsigns, not involving any general idea but rather actual fact only. It is interesting here to compare Peirce's examples of such signs. It involves the recurring weathercock, the painting with a legend, but also perfectly naturally

occurring shapes such as footprints.[35] So the simplest Dicent Sinsign is a natural process functioning as a sign for some interpreter by indexically producing an icon of the object. The object must be a singular, individual object. That does not imply the sign immediately facilitates the recognition of that object. Peirce's own example. is Robinson seeing for the first time Friday's footprint. He realizes this track stems from an existing person—but he has as yet no idea which person. So this sign is indefinite, implicitly having an existential quantifier 'Some person made this footprint'. The weathercock is a simple example of a measurement device, constructed so as to select, isolate, magnify, render clear some iconic information through an indexical process. Individual measurements made with such tools then qualify as Dicent Sinsigns.[36] The

[35]"Dicisigns are either symbols, when they become genuine *propositions*, or they are *informational indices*. Almost all indices are either informational or are elements of informational indices. Thus, when Robinson Crusoe found the footprint generally spoken of as Friday's, we may suppose that his attention was first attracted to an indentation of the sand. So far it was a mere *substitutive index*, a mere something apparently a sign of something else. But on examination he found that 'there was the print of toes, heel, and every part of a foot', in short, an icon converted into an index; and the connection of this with its presence on the shore, could only be interpreted as an index of a corresponding presence of a man. We thus see clearly that a dicisign, or information-bearing sign, is a sign that indicates a Secondness in its object by a corresponding secondness in its own composition." (Ms. 478, 46–47, alternative version of *Syllabus*, 1903)

[36]The most thorough analysis of the weathercock is found in Ms. 7 ("On the Foundations of Mathematics", around 1903): "The reference of a sign to its object is brought into special prominence in a kind of sign whose fitness to be a sign is due to its being in a real reactive relation,—generally, a physical and dynamical relation,—with the object. Such a sign I term an *index*. As an example, take a weather-cock. This is a sign of the wind because the wind actively moves it. It faces in the very direction from which the wind blows. In so far as it does that, it involves an icon. The wind forces it to be an icon. A photograph which is compelled by optical laws to be an *icon* of its object which is before the camera is another example. It is in this way that these indices convey information. They are *propositions*. That is they separately indicate their objects; the weather-cock because it turns with the wind and is known by its interpretant to do so; the photograph for a like reason. If the weathercock sticks and fails to turn, or if the camera lens is bad, the one or the other will be *false*. But if this is known to be the case, they sink at once to mere icons, at best. It is not essential to an index that it should thus involve an icon. Only, if it does not, it will convey no information." The fact that the weathercock is constructed for its purpose is not central, however. It adds to the clarity, precision and usefulness of the tool, but the crucial issue—an icon produced by an index—is shared with objects not so constructed such as grass or trees bending in the wind and thus indicating its direction. Thus, a fossil contains in itself the possible propositions which science may once be able to construct from the investigation of it: "...if, for example, there be a certain fossil fish, certain observations upon which, made by a skilled paleontologist, and taken in connection with chemical analyses of the bones and of the rock in which they were embedded, will one day furnish that paleontologist with the keystone of an argumentative arch upon which he will securely erect a solid proof of a conclusion of great importance, then, in my view, in the true logical sense, that thought has already all the reality it ever will have, although as yet the quarries have not been opened

painting with a legend, however, is more complicated. Not only does it have an explicit syntax which we discussed above—it is also not as evident that the predicate is without general qualities. Very often, painters idealize the person portrayed, not only in the sense that they beautify him but also in the sense that they seek to capture typical expressions, looks, postures, etc. so that the painting not only communicates actual fact, but also more general information about its object. In that sense, paintings may contain different degrees of generalities, on a continuous gradient scale from pure images to diagrams. Photographs may also display such generality, not by means of the photographic process alone and not only by means of techniques like the "composite photographs" discussed, but also aided by the very selection process of the "best" photo among many available. This may be seen, e.g., in more or less scientific illustrations, such as those in an atlas of mushrooms. The watercolor painting of a mushroom in such a book should depict all of the *typical* visual properties of the species in order to aid identification—resulting in a painting which may be *more* typical than any particular, existing specimen of the species in reality. Also photographs used in such books must be selected so as to display all typical features of the appearances of the mushroom species in question, thus embodying general qualities, even if actually depicting individual organisms. Retouching, 'photoshopping' and related processing of photographs, of course, may aid in the production of photographs serving as more general predicates describing types. Thus, there seems to be a continuous gradient from completely singular Dicent Sinsigns on the one end to fully Dicent Symbols with general predicates, be they linguistic or diagrammatic or otherwise, on the other end.

This analysis leaves us with the seemingly intermediary category of Dicent Indexical Legisigns. At a first glance, it may appear as an artifice of Peirce's system of combining the three trichotomies. His examples of this category, in any case, seem strangely wanting and peripheral. One is the type of a "street cry", supposedly a ritualized shout, as that of a street vendor, facilitating the recognition of the individual uttering it; the other is the answer to the question "Whose statue is this?"—*"It is Farragut"*. The reason it is not, like the full proposition, a symbol is that it has, like the sinsign, no general predicate while, on the other side, the sign *itself, qua* legisign, is general. The predicate should

that will enable human minds to perform that reasoning. For the fish is there, and the actual composition of the stone already in fact determines what the chemist and the paleontologists will one day read in them (...) It is, therefore, true, in the logicians sense of the words, although not in that of the psychologists, that the thought is already expressed there" ("A Sketch of Logical Critics", 1911, EP II, 455). Peirce's picture theory of Dicisigns implies that facts in reality already have the structure of the Dicisign that may represent them.

be typical as a sign, but not general as to its contents—this is why individuals, proper names (or, supposedly, pronouns) are involved in the examples given.

There are some strange discrepancies here, though. "It must involve an Iconic Legisign to signify the information and a Rhematic Indexical Legisign to denote the subject of that information", Peirce said in the definition of this category of Dicisigns above, and the latter category is identified simply with proper nouns while the former can be examplified in diagram types, apart form their individual appearance in diagram tokens (sinsigns). But in the examples given, the proper name does not appear as the subject but as the *predicate* slot of the proposition. What would a sign look like actually fitting the description quoted? It would have a proper noun (or pronoun) as a subject, and a diagram type as the predicate. It might be a map with a legend—such as a map of Rome (the diagram predicate part) with the name "Rome" and other geographical names indicated in the map (the proper name subject part). But why would such a sign not simply be a Dicent Symbol?— every map is, to some degree, general and provides information not only about the geographical layout of an area at a particular point of time like a photo snapshot would do.

The examples which Peirce himself gives are thus quite different from this analysis. They pertain to information about object names—identification statements (the street cry identifying the person yelling it; "It is Farragut", identifying the individual depicted). These examples give the idea that the category of Dicent Indexical Legisigns should rather be categorized as Dicisigns in which names or indices occupy the predicate slot, supposedly including also naming speech acts ("This is known as a Z" "I refer to this as an X", "I baptize thou Y", "Let me present you to Mr. W", "This is called a 'tree'"). If we take that to be the case, the otherwise hazy category of Dicent indexical legisigns would occupy an important role. On a gradient between this category and full-fledged propositions would then appear signs which not only name or identify individual objects, but classes or continua of such objects ("I define a line as that which has length and no breadth", "Element nr. 92 is Uranium"), that is definitions, claims about class-names, etc.

3.13 Meanings and Objects of Dicisigns

Dicisigns being the central type of *efficient* signs, the establishing of their meaning is naturally important to a pragmatist semiotics like Peirce's. The relation between sign and meaning in Peirce generally being one of inference, the meaning of a Dicisign is described in terms of which inferences it is possible to draw from it. Thus, in the Lectures on Pragmatism, Peirce simply says:

"...what we call the *meaning* of a proposition embraces every ob-
vious necessary deduction from it." ("The nature of meaning", Lec-
tures on Pragmatism 1903, EPII 214, 5.165)

So, assessing the meaning of a sign is effectively conducting an Argument. The
important constraint here is to *obvious* deductions from·the Dicisign only, rul-
ing out less obvious, maybe yet never performed deductions, e.g. theorematic
deductions from it (cf. ch. 10). In the same lecture, we find a bit different
definition of Dicisign meaning:

> "On the whole, then, if by the *meaning* of a term, proposition, or
> argument, we understand the entire general intended interpretant,
> then the meaning of an argument is explicit. It is its conclusion,
> while the meaning of a proposition is all that that proposition or
> term could contribute to the conclusion of a demonstrative argu-
> ment." ("The nature of meaning", 1903, EPII, 220)

Here, the "obvious" criterion has vanished, and the meaning instead is defined
as the sum of possible contributions of that Dicisign to the conclusion of an
Argument—not ruling out, e.g. non-obvious, theorematic deductions from it,
requiring construction, experiment, and proof. This vacillation or ambiguity
probably lies behind the development, in the mature Peirce, of the doctrine
of *two* objects and *three* meanings (or interpretants) of signs. We already saw
how an early version (primary/secondary object) was prompted by the analysis
of the syntax of Dicisigns in the *Syllabus* deduction. It evolves into Peirce's
general distinction between Immediate and Dynamical Objects of a sign:

> "As to the Object, that may mean the Object as cognized in the
> Sign and therefore an Idea, or it may be the Object as it is regard-
> less of any particular aspect of it, the Object in such relations as
> unlimited and final study would show it to be. The former I call
> the *Immediate* Object, the latter the *Dynamical* Object. For the
> latter is the Object that Dynamical Science (or what at this day
> would be called 'Objective' science,) can investigate." (Review of
> Lady Welby, 1903, 8.183)

The Dynamical Object, hence, is the object including all of its aspects, such as
potentially laid bare by scientific investigation in the limit. This, of course, cf.
Peirce's realism, is, at the same time, the object in itself, as it exists indepen-
dently of perception or participation in any semiotic investigation processes.
The Immediate Object has posed more problems to many interpreters. In what
follows after the quote, Peirce explains that the Immediate Object is the object
"as cognized in the Sign" in terms of "the occasion of sundry sensations". At

other occasions, Peirce has described the Immediate Object as "...the object as the sign itself represents it".[37] This has taken some interpreters to surmise the Immediate Object should be the object as it is depicted, described, imagined, or signified in the sign. But in that case, it would no longer be an object category, but a meaning category. And as there are already three interpretant categories, cf. below, it would seem to overpopulate the field of interpretants if the Immediate Object should also count as part of the sign's meaning.

But the fact that the Dicisign's subject is claimed to be indexically connected to its referent object provides the relevant interpretation of what is the Immediate Object. Thus, the Immediate Object has nothing to do with describing the characters of the object, rather, the Immediate Object *is* the claimed indexical connection of the sign with its object, that which in the *Syllabus* deduction was taken to be the secondary object of the Dicisign, the object category corresponding to the meaning category of the icon of the sign itself in the predicate. This becomes obvious from the following reflection where Peirce imagines his wife asking him, one morning, about the weather: "I reply, let us suppose: "It is a stormy day." Here is another sign. Its *Immediate Object* is the notion of the present weather so far as this is common to her mind and mine—not the *character* of it, but the *identity* of it. *The Dynamical Object* is the *identity* of the actual or Real meteorological conditions at the moment" (Letter to James, March 14, 1909, 8.314). Neither the Immediate Object nor the Dynamic Object is concerned with descriptive characters—this is left to the meaning categories. Both deal with the *identity* of the reference.

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[37]The full quote is interesting in itself: "But it remains to point out that there are usually two Objects, and more than two Interpretants. Namely, we have to distinguish the Immediate Object, which is the Object as the Sign itself represents it, and whose Being is thus dependent upon the Representation of it in the Sign, from the Dynamical Object, which is the Reality which by some means contrives to determine the Sign to its Representation. In regard to the Interpretant we have equally to distinguish, in the first place, the Immediate Interpretant, which is the interpretant as it is revealed in the right understanding of the Sign itself, and is ordinarily called the *meaning of the sign;* while in the second place, we have to take note of the Dynamical Interpretant which is the actual effect which the Sign, as a Sign, really determines. Finally there is what I provisionally term the Final Interpretant, which refers to the manner in which the Sign tends to represent itself to be related to its Object. I confess that my own conception of this third interpretant is not yet quite free from mist." ("Prolegomena to an Apology for Pragmaticism", 1906, 4.533)

Here, the Immediate Object is not only defined in terms of "Representation" but also as something whose being is dependent upon the sign. These ways of arguing may easily be mistaken for saying the sign creates a description of the object which is the IO. But "representation" in Peirce generally means denotation rather than signification, and the dependence of the IO on the sign does not exclude the dependence of both upon the DO— but must be taken to mean that the cutting out or selection of IO from the DO is due to the interaction with the sign—rather than taking the IO as being a meaning created by the sign.

So the Immediate Object is rather those parts or aspects of the Dynamical Object with which the sign claims to stand in indexical connection—including that very connection itself. Thus, the complex of light rays informing the eye about the visual structure of an object is the Immediate Object of that visual sign—or, to be more precise, the aspects of those light rays which are indexically influenced by the object and so informing about its appearance. In our interaction with objects, we rarely if ever interact distinctively with the whole of an object, with all of its parts and aspects, simultaneously. Rather, we stand in different, specific causal relations with aspects of the object, and it is the specific selection of those aspects and parts which forms the Immediate Object of the Dicisign. In that sense, the Immediate Object includes a part of the Dynamical Object—the part standing in indexical relation to the sign. And for both of them it holds that "...acquaintance cannot be given by a Picture or a Description ..." (ibid.), but only by indexical connection to the object.[38] Unlike Russell's distinction between knowledge by Acquaintance and by Description, Peirce's version claims that *both* must be present in any true Dicisign, because indexical Acquaintance, taken by itself, is stripped of all descriptive capacity which is reserved for the predicate aspect of the Dicisign:

> "It is usual and proper to distinguish two Objects of a Sign, the Mediate without, and the Immediate within the Sign. Its Interpretant is all that the Sign conveys: acquaintance with its Object must be gained by collateral experience. The Mediate Object is the Object outside of the Sign; I call it the *Dynamoid* Object. The Sign must indicate it by a hint; and this hint, or its substance, is the *Immediate* Object. Each of these two Objects may be said to be capable of either of the three Modalities, though in the case of the Immediate Object, this is not quite literally true." (Letter to Lady Welby, SS 83, 1908)

This implies, of course, that the Immediate Object must leave certain aspects of the Dynamical Object unspecified. In an outline of a trichotomy of signs according to their Immediate Object, Peirce distinguishes between indefinite, singular, and distributive (elsewhere, vague, singular, and general) signs; the former and the latter both being characterized by leaving parts of the Dynamic Object not directly referred to. In indefinite signs, "...the immediate object is only a possible presentment of a dynamic object, a fragment of it, the rest

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[38] But do we need another index in order to connect to this index-object complex? Peirce does not address this, but we may assume this worry is ruled out for continuity reasons: an index of an index of an index ...of an object will still be an index of the object for continuity reasons similar to the *Nota Notae*.

being held in reserve, so that there is nothing in the immediate object to prevent contradictory attributes being separately possible of it." Thus 'A certain man' may turn out to be rich. He may turn out to be poor" (Ms. 339, "Logic Notebook", 256r 1905 Oct 10). Conversely, in distributive or general signs, the Immediate Object may be substituted for any Dynamic Object fitting the Immediate Object—as in "Any man". The Immediate Object, in both cases, involves a fragment of the Dynamical Object only and is hence necessarily incomplete and contains some degree of vagueness or generality, respectively. Even in the case of singular signs, where the sign precisely denotes its object (a limit case only, according to Peirce), the Immediate Object is but the end of a singular indexical connection terminating in the Dynamic Object. For this reason, Hilpinen has rightly compared the Immediate Object to Meinong's notion of "incomplete objects" whose function is as auxiliary objects (*Hilfsobjekte*) in connecting to the full, complex objects which it is impossible to intend every aspect of (Hilpinen, in press).

The Immediate Object may vary, of course, in degrees of elaboration. The same entity may be the object of several Dicisigns forming "collateral observations" relative to each other. The Dynamic Object always exceeds the sum of moments of causal interaction connecting it to Dicisigns—which is seen from the fact that a visual object has an infinity of profile shapes in between any two perceived such shapes. For that reason, it is "...plainly impractible, therefore, to restrict the meaning of the term 'object of a sign' to the Object strictly so called. For, after all, collateral observation, aided by imagination and thought, will usually result in some idea, though this need not be particularly determinate; but may be indefinite in some regards and general in others. Such an apprehension, approaching, however distantly, that of the Object strictly so called, ought to be, and usually is, termed the "immediate object" of the sign in the intention of its utterer. It may be that there is no such thing or fact in existence, or in any other mode of reality; but one surely shall not deny to the common picture of a Phoenix or to a figure of naked truth in their well the name of a "sign", simply because the bird is a fiction and Truth an *ens rationis*" ("Pragmatism", 1907, Ms. 318, one of several parallel drafts, 40-41, EP II 409).

In such cases, however, no real index connects the alleged Immediate Object to any existing Dynamic Object. Here, the doctrine must assume an as-if index to make believe it so refers (to reality in a lie, to an agreed-upon imaginary world in the case of fiction), or the index points to a general object of thought.

This division of the Dicisign's object throws light upon the triadic differentiation of its meanings. The above-mentioned "obvious" deductions from a Dicisign constituting the Immediate Interpretant now correspond to the Im-

mediate Object in the sense that they also remain a meaning incomplete, as a subset of all possible deductions from the Dicisign. That ideal set of all such deductions rather corresponds to what Peirce calls the "Final" Interpretant—the sum total meaning of the Dicisign which investigation would reveal in the limit only. The "Dynamic" Interpretant, then, is the meaning such as it is actualized in any particular, concrete use of the Dicisign, always only another subset of the Final Interpretant (plus erroneous, actual inferences as well). So the Dynamic Object and the Dynamic Interpretant do not correspond to each other, confusingly, and the puzzle stemming from their terminological similarity has the reason that "dynamic" used about objects is taken to mean "at the end of dynamic scientific investigation" while "dynamic" used about interpretants is rather taken to mean "in actual existent dynamic sign exchange".

In the continuation of the quote where Peirce informs his wife about stormy weather, the three interpretants of that Dicisign are presented as follows: "The *Immediate Interpretant* is the *schema* in her imagination, i.e. the vague Image of what there is in common to the different Images of a stormy day. The *Dynamical Interpretant* is the disappointment or whatever actual effect it at once has upon her. The *Final Interpretant* is the sum of the *Lessons* of the reply, Moral, Scientific, etc." (8.314)[39] The three meaning categories are taken to be 1) the immediate schema presenting the general picture of a stormy day,—adding, in the blank of that predicate, the reference to the particular occasion of utterance, it should be noted (the meaning of a Dicisign is not only its iconic-predicative part but what can be inferred from the application of that part to a given subject)—the 'obvious' inferences from it; 2) the actual interpretation made by a sign interpreter in the situation of communication— in this case, the wife's change in emotion and action upon learning the fact reported by the Dicisign, deciding to stay inside and light the fireplaces etc.; 3) the Final—in other cases, the 'Normal'—Interpretant of the Dicisign is all which may be inferred from it, by all means of investigation in the limit. The three meaning categories thus may be compared as follows: 1) lies close to dictionary meaning in a broad sense (but comprising also other signs, of course, than linguistic signs), close to the normal use of the word 'meaning'; 2) equals pragmatic meaning relative to a situation of communication, determined by the dialogic string preceding it and the collateral knowledge involved in the situation; 3) corresponds to the ideal limit of all possible knowledge to which the Dicisign in question may, in the future, contribute.

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[39] The CP erroneously has '... the vague Image *or* what there is in common to the different Images of a stormy day.'

3.14 Conclusion

Peirce's doctrine of Dicisigns, when pieced together from his different writings around 1900, constitutes an early and fairly elaborated doctrine of propositions. My claim, however, is that it is not only of historical interest. Recent philosophical discussion has focused upon issues such as: are propositions structured—or are they some sort of primitives (like mappings from sentences to sets of possible worlds)? Do they exist in any sense at all—already Russell famously ended up finding it burdensome to accept the commitment to any kind of existence of all false propositions, this prompting him to give up the idea of propositions. Does their existence depend upon the existence of human language and its syntactical and semantic devices?

Peirce's doctrine articulates a strong claim for what are nowadays called "structured propositions". His analysis of what keeps propositional structure together forms a sophisticated doctrine not far from some present positions (such as King 2007): the syntactical connection between predicate and subjects in a proposition functions as an icon of the actual, indexical connection between their correlates in terms of objects and relations. It is a picture theory of Dicisigns—but it lacks the insistence of Wittgensteinian picture theories on a foundational level of logical atomism, taking instead the facts referred to by true propositions to be structural aspects of reality on any given level of description. The functional definition of Dicisigns— signs performing two simultaneous, different functions relating to the same objects, those of reference and description, transgresses the idea that propositions should depend upon the syntax of human language exclusively, opening the investigation of other syntactical combination strategies fulfilling the function to be charted in non-linguistic signs in human and non-human semiotics. As to the mode of existence of propositions, Peirce's doctrine is not completely clear—I think, however, its lack of clarity may be easily sanitized. As Short (2007; 231ff, 242ff) points out, two different ideas seem to compete in Peirce's doctrine. One claims propositions are signs—which may enter into more compound signs when those signs are asserted, assented to or subjected to other speech acts. [40]

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[40]Space does not allow us to discuss here Peirce's embryonic speech act theory according to which propositions are signs fit to be asserted—or to be the objects of other propositional attitudes like utterances, judgments, assents, interrogatives, imperatives, etc.: "One and the same proposition may be affirmed, denied, judged, doubted, inwardly inquired into, put as a question, wished, asked for, effectively commanded, taught, or merely expressed, and does not thereby become a different proposition", "Kaina Stoicheia", 1904, EP II 312; cf. Brock 1981. The important thing in our context is that propositions are ideal signs types which, in order to have actual effects, must be expressed in sign tokens in one of many possible ways. As to the central act type of assertion, Peirce identifies it with the willingness publicly to accept responsibility for the truth of the proposition involved and thus expose oneself to

Another claims propositions are ideal entities existing outside of space-time as mere possibilities. How could these two doctrines be reconciled? Short thinks the problem is "easily rectified" by preferring the ideal interpretation so that propositions are what may be abstracted from various types of Dicent Symbols—but not themselves being signs (245).[41] But do we have to make this choice? The idea of Dicisigns as signs is the source of much of the strength of Peirce's doctrine, so we would hesitate to give up that idea. In the ten-sign typology of the *Syllabus* combining the three basic trichotomies, the six most complicated signs are all legisigns, types, that is, none of them are actually existing signs but general sign types which appear in actuality only as instantiated in tokens, of which only three types of sinsigns exist. The four sign types involving Dicisigns—Arguments, Dicent Symbols, Dicent Indexical Legisigns, and Dicent Sinsigns—thus only have certain subtypes of Dicent sinsigns as their instantiating "outlet" to actual discourse, so to speak. Any actual use—such as an assertion—of a Dicisign requires its tokening in a sinsign. But that implies that Dicisigns, apart from the special case of Dicent Sinsigns, do possess the ideality of types, of legisigns. So the idea that Dicisigns are indeed signs need not be as remote from their ideality as Short presupposes. Short seems here to identify signs with tokens, sinsigns, only. Here Peirce's argument for their ideality: "A sentence, in the sense here used, is a single object. Every time it is copied or pronounced, a new sentence is made. But a proposition is not a single thing and cannot properly be said to have any *existence*. Its mode of being consists in its possibility. A proposition which might be expressed has all the being that belongs to propositions although nobody ever expresses it or thinks it. It is the same proposition every time it is thought, spoken or written, whether in English, German, Spanish, Tagálog, or how. A proposition consists in a meaning, whether adopted or not, and however expressed. That meaning is the meaning of any sign which should signify that a certain iconic representation, or image (or any equivalent of it) is a sign of something indicated by a certain indexical sign, or any equivalent thereof" ("RR" 1902, Ms. 599, 5–7).

The token sinsigns—sentences or other instantiations by means of gesture, picture, diagram tokens—are actual, existent entities, but the Dicisigns they

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the punishments and other social effects normally enacted upon liars. The act of assertion, thereby, differs not only from the proposition asserted as well as from the expression of it, but also from the act of assent whereby an individual personally accepts the truth of it. Thus, as Short also points out, Austin's famous quip that "With all his 66 division of signs, Peirce does not, I believe, distinguish between a sentence and a statement" (Austin 1961, p. 87n1, quoted by Short 2007, 242) is simply besides the point.

[41] It even leads Short into attempting a distinction between the Rheme/Dicisign/Argument trichotomy and the Seme/Pheme/Delome trichotomy (which are synonymous in Peirce).

instantiate are not. They are mere possibilities. But still they are structured possibilities—possessing the structured syntax of Peirce's doctrine: the syntactical coupling of the two functional constituent signs. That propositions, in that sense, are ideal signs, is expressed by the Legisign-Sinsign (Type-Token) distinction. Should this confuse us and give us Ockhamist headaches that this commits us to accept an infinity of possible propositions, combining merely possible subjects with merely possible predicates, including lots of meaningless and false combinations? Not more, I think, than we should take it as a heavy ontological burden to accept the infinitely recursive composition possibilities of human language or the indefinite range of yet unrealized compound possibilities of organic chemistry.

All in all, much can be learnt from Peirce's Dicisign doctrine, not only pertaining to the history of logic. The liberation of propositions from the iron cages of human language in the Frege-Russell tradition allows us to begin to grasp the logic and cognitive abilities of other animals as well as those of human beings freely mixing language with images, pictures, diagrams, gesture in order to understand and express Dicisigns. In the next chapters we shall attempt to distill such actual implications of Peirce's doctrine of propositions.