THE PROBLEM OF THE ESSENTIAL ICON

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1. ICON, INDEX AND SYMBOL

Charles Peirce made a well-known distinction between *icons*, *indices* and *symbols*. These are three kinds of *signification*—specifically, three kinds of relationship between a sign and its *object*. I use the term 'signification' instead of terms more familiar in analytic philosophy of language such as 'representation' or 'reference' in an attempt to loosen an apparent near-exclusive hold of the spoken and written word on many philosophers' thinking about *meaning*, which is relevant to our topic. The icon/index/symbol distinction has already been much investigated by Peirce scholars,[1] but a brief summary will be helpful.

Icons signify objects by resembling them.[2] For example, a map of Australia signifies the continent of Australia by being of the same shape (however roughly). One of Peirce's definitions of the icon states that its *parts* should be related *in the same way* that the objects represented by those parts are themselves related.[3] One might call this form of resemblance "structural resemblance," and the perspicuous representation of relations via structural resemblance is one of the icon's greatest strengths. There are obvious links here to the early Wittgenstein's "Picture Theory of Meaning," with the caveat

that one may distinguish between structural and properly *pictorial* resemblance insofar as there are structural mappings which are not good pictures. As Peirce notes, "Many diagrams resemble their objects not at all in looks; it is only in respect to the relations of their parts that their likeness consists."[4] The famous London Tube Map does not exactly represent the paths of its train-lines—it has been regularized, and is a more effective icon for that. On the other hand every pictorial resemblance is a structural resemblance, so structural is a generalization of pictorial resemblance. Of course the Tractatus is gnomic enough about meaning to leave it open that structural rather than pictorial resemblance is what Wittgenstein meant too.

Is *all* iconic resemblance structural resemblance? This claim is too strong; there might also be "simple icons." For instance, a particular color might be used to signify a girl who is wearing a dress of that color, or whose personality arguably possesses some shared qualities (for example 'sunniness,' or 'intensity'). Such cases, as well as structural resemblance, are covered by what is arguably Peirce's most general definition of iconicity, which will be used here: "An icon is a sign fit to be used as such because it possesses the quality signified."[5]

Indices (or 'indications') signify objects paradigmatically by being 'physically' connected with them (via causation or co-presence). Thus, for instance, smoke is an index of fire, and 'here' is an index of the place at which I stand and utter the word.[6] However the category generalizes to all brutely dyadic sign-object relationships. The meaning of 'brutely' in brutely dyadic is 'unmediated,' in a number of senses which will now be explained.

To those trained in analytic philosophy of language, these dyadic relationships may seem to fall into two separate categories. The first consists in brutely dyadic relationships between signs and objects 'in the world.' Under this heading the category has much in common with what is often referred to as "direct reference," embracing *demonstratives*[7] and the ostensive designation of natural kinds. The analytic philosopher naturally wants to extend ostensive designation of natural kinds to embrace 'rigid' designation more generally. This is a tricky issue, though, insofar as Peirce does not develop a detailed possible world semantics of the kind familiar today.[8] However at least some of what is arguably the purpose of rigid designation, to capture the way in which 'meanings ain't in the head,' *was* covered by Peirce in terms of a distinction between the so-called 'immediate' and 'dynamic' objects of a given sign.[9] *Proper names* might seem an obvious addition to this list. However, as has been noted,[10] our English, grammatical proper names are not 'logically proper names.' Although they may function indexically at some initial baptism, they are wont to be used more than once—they are not very useful otherwise. If used repeatedly they become symbols (to be defined below).[11]

What might seem to be a second category of Peircean index consists in brutely dyadic relationships of coreference between *two signs*. Under this heading fall relative pronouns, anaphora, and bound variables (argu-ably a formal-logic analogue of the previous two cases). It should be acknowledged that 'indexicality' is not always viewed in mainstream analytic philosophy of language as covering such phenomena. For instance, Perry argues that indexicals should be distinguished from anaphora.[12] Perry and Kaplan argue that demonstratives should be thought of as a distinct sub-class of indexicals because some further 'demonstration' in context is needed to secure the reference of 'that,' unlike more classical indexicals such as 'I.' Nevertheless, the brute dyadicity of the relationship *is* the key feature Peirce wished to capture with his notion of the index. He saw the relevant 'semiotic natural kinds' as most fruitfully carvable in such numeric terms.

To be exact, his formal characterization of the icon/index/symbol distinction proceeds via the 'essential adicity' of the relation by means of which the sign designates its object. Iconicity is essentially monadic insofar as the quality (whether simple or structural) by means of which an icon resembles its object is something that the icon would possess whether or not the object existed. (A cloud shaped like Richard Nixon would have the same shape if Nixon had never existed.) By contrast indexicality is essentially dyadic, as a footprint, for instance, would not exist without the foot which planted it, and there is no such thing as a 'one-place anaphor.'

Symbols, then, are essentially triadic. They signify objects via some kind of (further, independent) convention or rule. This convention is 'arbitrary' (in Saussure's sense) and must be learned. There is no real reason that the word used to signify Australia to its English-speaking inhabitants should begin with 'A.' But it does, and we must learn this to use it correctly. It is this rule or convention which *mediates* the reference of a symbol to its object, by contrast to the unmediated index. Most English words are symbols, and further examples are musical notes on a page, and amber traffic lights.

It is important to note that a symbol's conventional nature makes its signification *general*, because conventions are "general rules to which the organism has been subjected,"[13] and general rules can be applied any number of times in situations which display the appropriate (general) features. This is not true of the other two sign-types. Indices designate *particular existence*—Peirce writes, "[a]n indexical word . . . has force to draw the attention of the listener to some hecceity common to the experience of speaker and listener."[14] Some contemporary authors assign to indexicals similar pragmatic roles in particular contexts.[15] Icons designate *neither general facts nor particular existences*. They possess a mode of signification which is difficult to isolate in unmixed form and which Peirce sometimes describes enigmatically as 'a pure dream.'[16] This raises the interesting questions of why and how such a form of signification might be of any use to anyone, which will be addressed.

These three categories are not mutually exclusive: a given sign may fall into more than one. For instance, a footprint is both index insofar as it is caused by an actual push by a foot, and icon insofar as it has the foot's shape. The internationally recognized sign which directs drivers to the airport is both icon insofar as it looks somewhat like an aeroplane, and symbol insofar as it doesn't look *very much* like an aeroplane, and we have been taught to associate it with the imminence of an *airport* (rather than, say, an aeroplane factory). Finally, a shadow clock indexes the time insofar as the actual movement of the sun highlights a specific point on the dial, but symbolically designates it insofar as only numerals on the dial state what the time actually is. In this respect temporal words, such as 'now,' are not terribly different. 'Now' indexes a particular time by virtue of being uttered at that time, but it is a symbol insofar as one needs to learn (in English) that it is the phoneme 'now' which plays that function.

Despite this tendency for the three categories of signs to mix, Peirce claims they are irreducible to one another, and each plays a unique and vital role in thought. In an arresting if metaphorical remark he likened symbols to living tissue in the body of thought, indices to the skeleton "which holds us stiffly up to . . . realities," and icons to the blood which "with its swift changes supplies the nutriment for the main body."[17] And all three work together in real-world reasoning:

> Suppose a man to reason as follows: The Bible says that Enoch and Elijah were caught up into heaven; then, either the Bible errs, or else it is not strictly true that all men are mortal. What the Bible is, and what the historic world of men is, to which this reasoning relates, must be shown by indices. The reasoner makes some sort of mental diagram by which he sees that his alternative conclusion must be true, if the premise is so; and this diagram is an *icon* or likeness. The rest is symbols; and the whole may be considered as a modified symbol. It is not a dead thing, but carries the mind from one point to another.[18]

2. Defining the Question

Symbolic signification has never been invisible to analytic philosophers. It was taken for granted for most of the twentieth century, due to the aforementioned focus on the spoken and written word, that *all* signification takes this form—so taken for granted that explicit argument for it is hard to find. As is often the case, highlighting of the assumption arrived with its first major challenge. In the 1970s mainstream analytic philosophy of language caught up with Peirce in discovering 'the essential indexical.'[19] John Perry sketched a so-called "doctrine of propositions," the accepted wisdom which he claimed was refuted by recognition of essential indexicality. Perry blames the 'doctrine' on Frege, and its key claims for our purposes are:

i) Propositions (qua object of belief) "have a truth-value in an absolute

sense, as opposed to merely being true for a person or at a time"

ii) Propositions are individuated via 'concepts.'[20]

These claims conjure a model of language as comprised entirely of *de dicto*, general propositions built compositionally from 'concepts' which correspond in Peirce's terms most closely to symbols. For Perry equates them with Fregean senses, which are abstract objects. Their abstractness means they cannot be indices. If they have an iconic character (that is, somehow possess intrinsic qualities which resemble what they signify) then this was not mentioned by Frege in "On Concept and Object," nor by his descendents, *except* the early Wittgenstein, whose originality so often led him to perceive possibilities missed by other philosophers.[21] But the analytic tradition did not follow Wittgenstein in this, possibly because an intrinsic iconic character of concepts seems a *necessarily* obscure posit. Thus concepts are usually naively thought to signify what they do (when the question is considered at all) merely because of some arbitrary general rule, whether this consists in relatively plastic Humean 'custom and habit' or something more hard-wired in us and akin to natural law, and the possibility that there might not be a one-size-fits-all solution for how concepts signify is rarely considered.

That Perry's 'concepts' are in fact symbols can also be seen by the role they play in his argument against the doctrine of propositions. The argument revolves around cleverly constructed scenarios where it seems that one cannot explain someone's actions in terms of their beliefs unless the beliefs are somehow 'essentially indexical.' In the most famous, Perry chases a mystery shopper around the supermarket trying to tell him that he has a torn sack of sugar spilling out of his trolley, finally stopping because he realizes that the shopper with the torn sack is *him*. One cannot explain his stopping without attributing to him the belief of the form "*I* am making a mess," Perry claims.

He considers the idea that the 'I' might be shorthand for some "concept which I alone 'fit,'" for instance, "the only bearded philosopher in a Safeway Store West of the Mississippi"—call this description 'A.' He then rejects this, for it does not explain why he stopped to say that he realized something of the form, "I came to believe A is making a mess," if he doesn't believe that the person who uniquely fits A is *him*.[22] This makes it clear that A fails because of its *generality* which, as noted, pertains only to the symbol. For if A is general then Perry can mistakenly believe he doesn't satisfy A, or he can believe that he satisfies A but not know that he is the *only* person who satisfies A, or it might even be the case that there *is no* description which would uniquely identify him, even under conditions of complete general knowledge (conjuring a nightmare world of qualitatively identical philosophers pushing torn sugar-sacks around symmetrical supermarkets).

To sum up, a "classical" (or "pre-Perry") formal semantics for analytic philosophers may be defined as follows.[23] Assuming that **L** is our language, and **U** is the set of all existent things (frequently assumed to exhaust reality), and **I** is an interpretation function which connects every constant in **L** with an element in **U**, and assigns to every predicate in **L** the appropriate subset of **U**, then a sentence ϕ in **L** is true iff every individual denoted by the sentence does lie in the extension of the predicate in **L** to which it is assigned by the interpretation function. Every factor relevant to the truth-conditions (and thereby, it was thought, the meaning) of a sentence was envisaged to be made explicit in such a theory.

However, now that essential indexicality is now pretty much a given in mainstream analytic philosophy, formal semantics has accreted some epicycles. Roughly following David Kaplan,[24] reality is envisaged to consist not only of a set **U** of individuals, but also a

set **W** of (possible) worlds, and a set **C** of contexts. These contexts are possessed of features such as times, locations (both intra- and inter-world) and 'agents.'[25] In Kaplan's influential way of putting it, the meaning of indexical terms such as 'I' consists in a certain *character*, which takes into account the particular *context* in which the indexical is uttered, in order to deliver an overall *content* to a proposition. Thus character is a function from contexts to contents: for instance, 'I' is a function whose value at any context is the context's agent. The interpretation function now not only assigns constants and predicates in **L** to elements and sets of elements in **U** respectively, but also performs further remarkable tasks, such as delineating a context of utterance, determining a unique 'agent' for that context, and mapping the reference of 'I' onto that agent—not only in this world but all other possible worlds in which it might be appropriate to say that that 'same agent' appears. This new semantics has given rise to a "two-dimensional modal logic" whereby a 'secondary intension' corresponds to content, and a 'primary intension' to character.

The above discussion raises the question of the third term in Peirce's trichotomy of icon, index and symbol. Is there an '*essential icon*'? If so, what would be an example? Could any thought-experiments be framed which exhibit the irrefutable clarity of Perry chasing his trail of sugar around the supermarket because he lacked the irreducibly indexical information that the sugar-spiller was *him*? This issue is as yet pretty much untouched in analytic philosophy of language, and considering it opens up a series of intriguing questions.

The first question is of course, *is* there such as thing as an 'essential icon'? Answering this will require getting clear on what might be meant by 'essential' here. Should it be the same kind of essentiality that the essential indexical has? If not, how might it be different? If there *is* such a phenomenon, further questions arise. For instance: How

widespread is it? Is it possible to specify precisely what information icons signify in particular cases, or specify in any interesting and principled way the kinds of information they might signify in general? Finally, what if any challenges to contemporary analytic formal semantics might the phenomenon put forward? For instance, should it be complicated still further to introduce functions whose parameters are icons? How would that work? Do we need a 3D modal logic? What would that look like?

3. What is 'Essential' about the 'Essential Indexical'?

Despite strenuous use in centuries of metaphysics, in contemporary practice the word 'essential' is often unhelpfully vague. Essential indexicality might be explicated thus:

> EssIn1: Certain signs are 'essentially indexical' in that indexical signification is their *sole function* (i.e., they play no symbolic or iconic role).

However this interpretation can be ruled out right away. For as has been seen, according to Peirce, all words have some symbolic character insofar as their meanings must be learned, although they may be indices also—and of course 'I' is a word. Also, careful reading of "The Problem of the Essential Indexical" does not suggest that the above is what Perry has in mind either. Rather, it would appear that the "essential indexical" is not essential *simpliciter* but, rather, essential *for* something.

For what? Perry suggests that it is essential to explain a person's behavior in terms of his beliefs. In the supermarket he stopped his cart because he came to believe the sugar-spiller was *him*. At times Perry seems to suggest that in this case his relevant belief can only be expressed using the specific word 'I,' speaking of:

> the importance of the word "I" in my expression of what I came to believe. When we replace it

with other designations of me, we no longer have an explanation of my behavior.[26]

This might seem to suggest that essential indexicality consists in a claim such as:

EssIn2: Some *specific terms* have an irreducibly indexical dimension to their signification [i.e., wherever they are used]

'Irreducibly indexical' here means that a sign's meaning cannot be fully expressed in iconic or symbolic signs. Note the difference between this claim and the claim in EssIn1, that the sign is *purely* indexical. Prime candidates for such signs are of course, "Here," "now" and "I" (and, for those who follow David Lewis, "actual").[27]

However *does* indexicality pertain purely to certain key terms in this way? Perry seems to argue for this by claiming that if, rather than using the word 'I,' he had said, 'in the manner of De Gaulle,' "John Perry is making a mess," the explanation of his behavior would fail:

I would no longer have explained why I stopped and looked in my own cart. To explain that I would have to add, "and I believe that I am John Perry," bringing in the indexical again.[28]

But one might ask: to whom is this explanation being given? For instance, imagine Perry turning to his wife in the supermarket and saying, "Honey, I stopped the cart because I realized that John Perry was making a mess." Surely this would explain his behavior to *her* (although she might wonder why he is being so pompous). What notion of explanation is being invoked here? Perry says little about this.

Also it seems wrong to say that indexicality pertains to specific terms if those same terms might be used non-indexically. For instance, I might fancifully choose to call my house 'here,' and then (while not in my house) make a statement such as, "Here was built in 1910." To those who understood that I was talking about my house I would not be referring to the place in which I uttered the statement. So

it seems a simple list of terms will not suffice to explicate indexicality.

Here is another way of formulating the claim:

EssIn3: Some *propositions* have an irreducibly indexical dimension to their signification.

Sometimes Perry seems to lean towards this interpretation—for instance towards the end of the paper where he distinguishes belief states (expressible via sentences with unresolved indexicality) from real-world objects of belief, and suggests that the true moral of "the problem of the essential indexical" might be that there is no such thing as *de dicto* belief.[29] Overall, though, he conflates the two claims, speaking only of a 'missing conceptual ingredient.'[30]

Turning to iconicity, then, there are three possible analogous claims:

EssIc1: Certain signs are 'essentially iconic' in that iconic signification is their *sole function* (i.e., they play no symbolic or indexical role).

EssIc2: Some *specific terms* have an irreducibly iconic dimension to their signification.

EssIc3: Some *propositions* have an irreducibly iconic dimension to their signification. Once again, EssIc1 will be set to one side as not the true target.[31] How then are EssIc2 and EssIc3 to be investigated? Peirce's example of the three sign-types functioning together suggests that the icon's role is to portray *logical structure*. ("The reasoner makes some sort of mental diagram by which he sees that his alternative conclusion must be true, if the premise is so"). *Logic*, then, would seem to be where essential iconicity should be sought. Thus this claim will also be considered:

EssIc4: Some *arguments* have an irreducibly iconic dimension to their signification.

Interestingly, Peirce and Gottlob Frege—arguably the two greatest formal logicians of the nineteenth century—took a keen interest in logical *notation*, and at various times endeavored to make theirs as perspicuous as possible. Although early in his career Peirce made many innovations in algebraic logic—including the discovery, with his student Mitchell, of predicate logic independently of Frege—shortly afterwards he invented a diagrammatic logical notation which he called his "Existential Graphs," and claimed was his logical '*chef d'oeuvre.*'[32] This will be discussed in section 6. However there is gathering evidence that Frege also was aware of, and working with, iconic dimensions of his own notation. This will be discussed in section 5. First, however, the next section, 4, will present an outline of an expressivism recently put forward by Robert Brandom, which will provide helpful background. After that, sections 7 and 8 will return to our three key claims concerning 'essential' iconicity in order to determine whether they are true, and the paper will finish with some general conclusions in section 9.

4. Brandom's Expressivism

In his books *Making It Explicit* and *Articulating Reasons* Brandom introduced a new and important expressivism to the philosophy of language, whose point is to deny that, in some sense, semantics can be made fully explicit. He sources the position in the Romantic period when, he claims, new attention was paid to signification as a process of *expressing* ("the process by which inner becomes outer when a feeling is expressed by a gesture"[33]), as opposed to a process of *representing* (understood as the transparent statement of independent fact). In the former the mind is seen as more active, in the latter, more passive. Brandom generalizes the view from a 'Romantic' to a 'Rationalist' expressivism, by viewing 'expression,' famously, "as a matter not of transforming what is inner into what is outer but of making explicit what is implicit."

Making content explicit consists in putting into propositional form at least some of its inferential role, the moves in the language game which it makes possible. In thus transforming practices into statements, the process is given a pragmatist twist insofar as, Brandom claims, it frequently consists in "turning something we can initially only *do* into something we can *say*."[34] This is a form of pragmatism whose key idea is that 'knowing that' is subordinate to 'knowing how,' in contrast to the approach of contemporary mainstream epistemology.[35]

It is important to note that not all examples of expressivist 'sayings' are 'linguistic sayings.' Consider musical notation, for example. Making music is a set of practices transmitted for most of human history via direct person-to-person copying of *actions*. However during the Renaissance, innovators developed a system of notation which enabled music to be reproduced without face-to-face transmission, thereby making explicit on a written page what was previously only implicit in performance.

Brandom makes a profound point about how under expressivism the relationship between the implicit and the explicit should be understood. One cannot assume that making a practice explicit consists in translation of a 'content' that is antecedently definable (explicitly):

> [W]e need not yield to the temptation . . . to think of what is expressed and the expression of it as individually intelligible independently of consideration of the relations between them. . . . And the explicit may not be specifiable apart from consideration of what is made explicit.[36]

The musical case *is* a plausible example of this. A sonata's musical score is surely not (wholly) intelligible independently of an understanding of sonatas qua musical performances. On the other hand, the reverse claim,

that sonatas might be unintelligible without musical notation seems less plausible.[37] Crucially, this demonstrates that the explicit is parasitic on the implicit in a way that does not hold vice versa.

One of Brandom's most interesting philosophical moves (for which he credits Sellars) is to self-consciously highlight the practice of philosophy itself qua 'Socratic method,' as the pulling of unselfconscious implicit *practices* into explicit *statements* that might be critically appraised.[38] A crucial example of this philosophical practice is, of course, formal logic. Failure to appreciate this, Brandom suggests, has led to confusion and mistaken views about 'the semantics of logic,' such as the view that formal logic describes a *sui generis* set of facts. Rather, it should be seen as a way of *saying* what we are *doing* when we actually make inferences in ways that guide us to make further inferences without fear of going wrong.

Can *all* logical form be made explicit? For a representationalist, if logical form is part of 'everything that is the case,' and the widespread applicability of logic would seem to provide some argument that it is, why shouldn't this be possible? For the expressivist, however, it would appear not. Always some logical form must elude being transformed from 'doing' into 'saying,' given that the transformation from doing into saying is itself a doing. It was noted that the process of 'making it explicit' is reflexive—surely for this very reason it must always be incomplete? However one must be careful with the quantifier scope within this claim. The claim is not that *some specific* content cannot be made explicit, merely that whenever some specific content is captured and made explicit, *some further* specific content remains in practice as a necessary condition for the success of the capture, *albeit* that that practice is now open for its own further capture.[39] This was arguably Lewis Carroll's point in his puzzle of 'Achilles and the Tortoise,' which will be discussed further below.

Once again the early Wittgenstein saw further than many of his contemporaries here, drawing his famous distinction between what can be 'said' and what can only be 'shown.'[40] This raises the following question. Must all Brandomian expressivism be (as suggested by Brandom) a *pragmatist* expressivism—a *saying* of what was previously only *done*? Or might expressivism be generalized still further? Might it equally cover *saying* what was previously only *shown*? Might Wittgenstein's Picture Theory of Meaning be properly located in the expressivist tradition? This question will be pertinent to our investigation into the essentiality, or not, of the icon. With Brandom's expressivism outlined, its relevance to Frege's logical notation will now be explored.

5. Iconicity in Frege's Begriffsschrift

Danielle Macbeth[41] has introduced an intriguing new expressivist interpretation of Frege's 'concept script.' She claims it is not (as is almost universally understood) an early clumsy attempt to realize standard quantificational logic, but an *expressive alternative* to it, at least partly by virtue of certain iconic qualities. Before discussing this claim, it should be noted that delicate issues arise here with respect to Frege's logicism. Frege's logicism may usefully be understood as the attempt to eliminate appeals to *intuition* in the basic proofs of arithmetic. A comparison with Kant is instructive here. John MacFarlane[42] has argued that although Frege's higher-order quantifiers and skolem functions can be expressed in Kant's logical system, this can be done only by using nonlogical constructions which only make sense with respect to a faculty of 'intuition,' which presents our minds with something 'sensible' about which it forms judgments. Frege was

dissatisfied with this, being always terribly worried about allowing the possibility of error to creep into proof, via 'logical gaps.' Thus Ed Zalta writes:

> Frege saw himself very much in the spirit of Bolzano (1817), who eliminated the appeal to intuition in the proof of the intermediate value theorem in the calculus. . . . A Kantian might very well simply draw a graph of a continuous function which takes values above and below the origin, and thereby 'demonstrate' that such a function must cross the origin. But . . . [t]here are good reasons to be suspicious about such appeals: (1) there are examples of functions which we can't graph or otherwise construct for presentation to our intuitive faculty . . . (2) once we take certain intuitive notions and formalize them in terms of explicit definitions, the formal definition might imply counterintuitive results; and (3) the rules of inference from statements to constructions and back are not always clear.[43]

Crucially, Frege denies Kant's claim that without sensibility no object would be given to us.[44] Rather, he claims that we can "grasp" objects qua analytic statements which govern the extensions of concepts (a good example being the numbers).

Given all this, one would think that more than any other logician Frege should leave no role in his logical notation for the iconic. But things are not so simple according to Macbeth. I will now sketch some of the iconic features she attributes to Frege's notation, then discuss how they might be reconciled with the logicism just outlined.

i) The 2D Conditional

In *Begriffsschrift* a sentence such as, "If the sun is shining then John is happy," may be represented thus:
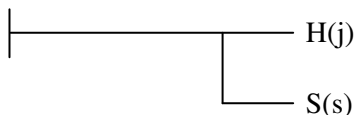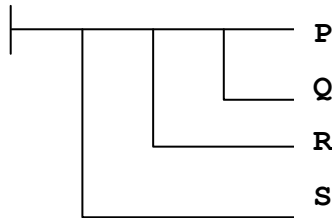

It is usually considered that this notation's only (trivial) virtue is that it "enables us to dispense with brackets."[45] However Macbeth claims that Frege's notation captures meaning not expressible linearly. First, the way the antecedent 'hangs off' the consequent represents that the consequent is true *under the condition* represented by the antecedent. Furthermore, Frege's notation suggests that the consequent (the 'conditioned') is more important than the antecedent (the mere 'condition'), by placing it first, i.e., highest. It should be noted that these iconic features are not *purely* iconic, however, insofar as other graphical means could have been devised to signify the same things. For instance, the consequent's relative importance could equally be signified by placing it to the left of the antecedent. Insofar as Frege's choice to use 'up' rather than 'left' needs to be learned, the convention is symbolic.

More profound and more purely iconic expressivities may be discerned in the representation of complex conditionals. In his mature logic, Macbeth argues, Frege recognized that his notation allows all logically equivalent linear formulations of complex conditionals to be represented at once. Consider for example:

$$S \supset (R \supset (Q \supset P))$$
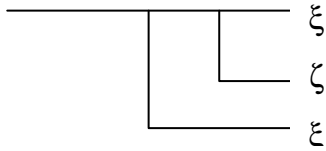
In Frege's notation this becomes:

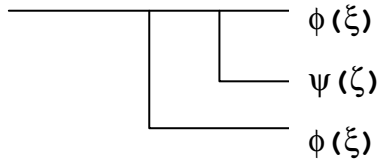This very same diagram may then be read as:

$$S \supset ((R \, \& \, Q) \supset P)$$

by analyzing it as, "(P on two conditions, namely Q and R) on condition that S." Similar analyses can produce the following variant readings (also logically equivalent):

(S & R) ⊃ (Q ⊃ P)

(S & R & Q) ⊃ P)[46]

which "must be proven in standard (one-dimensional) notation."[47] This renders Frege's notation *essentially* 2D, Macbeth argues, since "corresponding to it are a variety of provably equivalent serially ordered linear structures."[48]

Furthermore, Frege's conditional notation can be thought of as a resource not just for analyzing sentences into logically equivalent variants, but also for abstracting from sentences arbitrarily complex logical structures, and generalizing them.[49] For instance, the following may be regarded as defining a unique ternary connective:

Similarly, the following may be regarded as defining a unique complex predicate:

The way in which Frege's notation makes it possible to recognize *arbitrarily logically complex* new concepts (and then to generalize them to create new thoughts) was in fact one of the major advances of Fregean predicate over the old Aristotelian logic. It's worth emphasizing that the same sentence may yield different Fregean analyses *without being ambiguous*. As Dummett has pointed out:

> The analysis of a sentence enables us to discern a pattern in the sentence, a pattern it shares with every other sentence resulting from inserting an argument into the argument-place of the 'function.' . . . The pattern is not imposed, since

it was there to be discerned; but it is selected from among many different if equally discernible patterns. . . . Thus it would in principle be possible to grasp the thought expressed by "Brutus killed Brutus" without noticing that it exhibited a pattern shared by 'Cato killed Cato," but not by "Brutus killed Caesar": it is by noticing that common pattern that we attain the concept of suicide.[50]

How is the pattern which "Brutus killed Brutus" shares with "Cato killed Cato" (as opposed to the pattern it shares with "Brutus killed Cato") discerned? It must be *seen*, as structures are. In this way, Frege claimed, deduction is not necessarily a mechanical thought-process, but can be highly creative. Dummett writes:

> Since the form of the analysis was not uniquely determined by the content of the sentence analyzed, deductive reasoning must therefore be, in some part, a creative intellectual operation. All this put Frege almost alone amongst philosophical logicians, in possession of an account of how deductive reasoning could be simultaneously certain and fruitful.[51]

It will be demonstrated that Frege was joined in this 'account' by Peirce.

One final point lends even greater power and generality to Frege's logic. This is that, as was not evident in the example above, the alternative analyses into 'function' and 'argument' which a *Begriffsschrift* sentence makes possible may in fact identify functions and arguments at different 'logical levels.' For instance, Macbeth cites the first law of *Begriffsschrift*.

She claims that it may be understood as expressing that a first-level relation of the following form holds between propositions:

$$\xi$$
$$\zeta$$
$$\xi$$

but it may equally be understood as expressing that a second-level relation of the following form holds between any two concepts and two objects:

$$\phi\,(\xi)$$
$$\psi\,(\zeta)$$
$$\phi\,(\xi)$$

What do these two instances of the 'law' have in common? Once again, it appears that all that can be said is: something structural, which can be *seen* in the diagrams above.

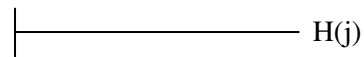Even the apparently trivial diagram:

$$H(j)$$
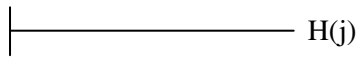
may be read as claiming that the first-order concept H(x) applies to the object j, or that the second-order concept of instantiation holds between the first-order concept H(x) and the object j. Macbeth goes so far as to say that sentences represented in Frege's notation have a main connective only relative to an analysis. In Frege's own words:

> [T]he thought itself does not yet determine what is to be regarded as the subject. If we say 'the subject of this judgment' we do not designate anything definite unless at the same time we indicate a definite kind of analysis.[52]

Frege claims that with the *Begriffsschrift* one is "stepping outside the confines of a spoken language designed to be heard and moving into the region of a written or printed language designed for the eye."[53] This suggests not only that there was a developing iconic dimension to his notation, but also that Frege himself was becoming self-conscious about it.

If Macbeth is correct, it might seem that a contradiction looms. On the one hand it would appear that Frege wants to remove all 'sensible objects' from arithmetic via logical analysis. On the other hand he appears to be mining the possibilities of his own logical notation for enabling its users to *see* new analytic possibilities. How do these claims fit together? One might try to argue that some of Frege's most profound logical steps were taken despite himself and his official doctrine. However such concessions are unnecessary. It was noted that making meaning "explicit" consists in translating inferential practice into propositional form. Perhaps then it might be argued that Frege's logicism consists not in endeavoring to make every step in mathematical reasoning *explicit*, but in endeavoring to make every step *visible*.

Although it might seem prima facie that these should be the same goal, they are really not. For instance, Frege argues for his 2D notation by stating, "a simple sequential ordering in no way corresponds to the diversity of logical relations through which thoughts are interconnected."[54] Macbeth explicates this remark by pointing out that even a simple 2D structure such as a multiplication table can be presented in linear form in a number of different ways, (for example, row by row, column by column, all values in the table in numerical order, and so on), such that, "each linear presentation of the information contained in the table highlights some relationships while it obscures others."[55] Similarly, although as noted one can view the Fregean graph:

$$H(j)$$

as claiming that the first-order concept H(x) applies to the object j, or that the second-order concept of instantiation holds between the first-order concept H(x) and the object j, one cannot take both perspectives *at the same time*, on pain of incoherence. Likewise, one can view the first law of *Begriffsschrift* as a

claim in propositional logic, or in predicate logic, but not at the same time. Thus *it is precisely because Frege cannot make everything explicit that he has to make it visible*. As noted, under expressivism the mind which produces and understands signs is seen as active rather than passive with respect to the content it produces and understands. It may be seen how in this way Frege is true to a Kantian legacy which is missed by many analytic philosophers.

It might be argued that Frege's real problem with the use of 'intuition' in Kantian arithmetic was that it is a *non-logical* intuition[56] (for instance, drawing on evidence from the senses). In other words, Frege's quarrel was really with Kant's claim that mathematics is *synthetic*. Thus for instance, in *Begriffsschrift* Part III, §23, he writes:

> Through the present example . . . we see how pure thought, irrespective of any content given by the senses or even by an intuition a priori can, solely from the content that results from its own constitution, bring forth judgments that at first sight appear to be possible only on the basis of some intuition.[57]

The astute reader may now ask: Does that mean that one can have analytically true icons? A quick but facile answer would be: how could one have *synthetically* true icons? What fact does, say: 'Δ' represent to be true? We saw that Peirce made the enigmatic claim that unlike symbols, which signify general realities, and indices, which signify particular existences, icons signify 'a pure dream.' We now start to glimpse some of what this might mean. The more careful answer, though, would be that iconic signs are not yet capable of truth or falsity at all. Truth-values, with their general implications for thought as a whole, can pertain only to symbols.

At any rate, a sense of the iconicity in Frege's logical notation, and some of the expressive resources it opens up, are now on the table. The next section will similarly investigate Peirce's existential graphs, before returning to the overall questions regarding "*essential*" iconicity.

6. PEIRCE'S EXISTENTIAL GRAPHS

Peirce claimed that a good logical icon has parts which are related *in the same way* that the objects represented by those parts are themselves related. As noted, he developed his existential graphs to try to realize this, writing:

> [The] purpose of the System of Existential Graphs . . . [is] to afford a method (1) as *simple* as possible (that is to say, with as small a number of arbitrary conventions as possible), for representing propositions (2) as *iconically*, or diagrammatically and (3) as *analytically* as possible.[58]

The graphs have now been well-explored by formal logicians,[59] but not as yet considered in relation to our question.

First of all, unlike Frege, Peirce was officially *not* a logicist. He saw mathematics and logic as distinct sciences with distinct aims and methods, although he did make the metaphorical remark that they are, "standing at the same place in the road, looking in different directions." He distinguished them by claiming that whereas mathematics is "the science that draws necessary conclusions," logic is "the science of drawing necessary conclusions."[60] What this subtle difference of expression amounts to in practice is that whereas mathematicians are interested in as quick and efficient a calculating technique as possible, in order to reach as many interesting and useful necessary conclusions as possible, logicians want to break down proofs into as many intermediate steps as possible, for the process itself is their object of study.[61]

It is often wondered how a *pragmatic theory of meaning*, with its empiricist orientation, accounts for meaning in *mathematics*. However for Peirce mathematics is as experimental a science as physics. However,

mathematics experiments on *diagrams*. I will now outline some of the graphs' key features. For simplicity's sake I will only discuss Peirce's propositional logic system—his 'alpha graphs.'

i) Conjunction

Conjunction is represented iconically by two propositions being 'scribed' side by side:
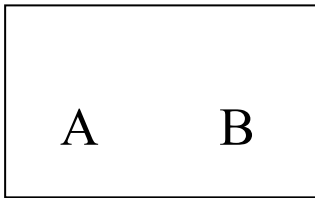
(A & B)

Interestingly, in Peirce's first try at a graphical logic system, the so-called "Entitative Graphs," the juxtaposition of propositions represented *dis*junction. However, he soon switched, for interestingly notation-driven reasons. For, as Shin points out, the only way that (A & C) can be true is for A and C to be true in the same situation, whereas (A ∨ C) can be true by A being true and C false, or by A being false and C true, or by both A and C being true, and thus, "we will never get a picture of the situation in which the disjunctive fact . . . is displayed."[62] Insofar as it is *forced*, then, the choice to use juxtaposition to signify conjunction may be seen as *purely* iconic. More generally, we can see how necessity concerning the use of signs is becoming our criterion of their being iconic rather than symbolic.

ii) The Cut

Negation is represented by scribing an oval line (a "cut") around a section of the sheet of assertion and asserting the proposition inside it:
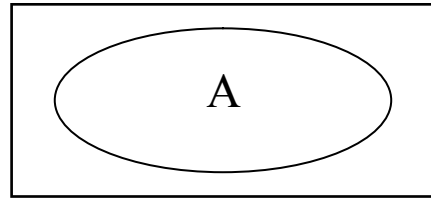

~A

Arguably the cut iconically represents the dualism (utter diremption) in classical logic between truth and falsehood. The graphs' equivalent of Double Negation (that when a proposition has two cuts around it they may both be removed) iconically 'brings back' the doubly negated proposition to 'join' other true propositions.

### iii) The Scroll (Conditional)

Peirce uses a combination of the signs for conjunction and negation to represent the conditional, dubbed 'the scroll':
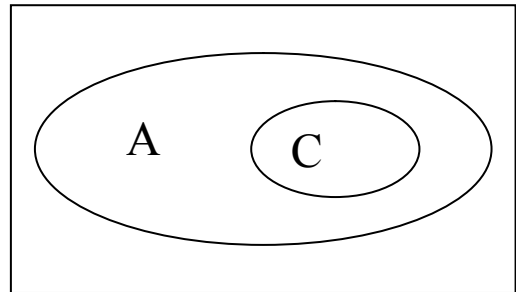
This simultaneously represents the equivalent (A ⊃ C), and (~A ∨ C) and ~(A & ~C). As for complex conditional propositions, if three scrolls are nested to graph S ⊃ (R ⊃ (Q ⊃ P)), this produces:
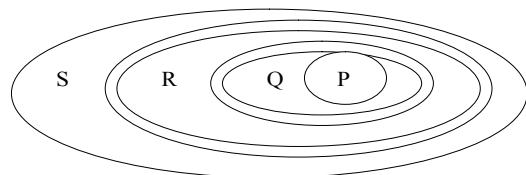
However 'double scrolls' are *visibly equivalent* to double negation. They thus may be removed:
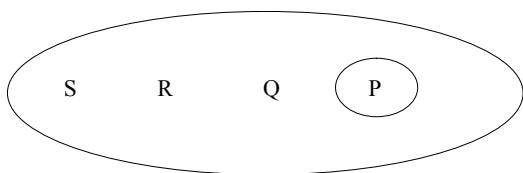
which clearly represents: (S & R & Q) ⊃ P), picking up the intermediate cases on the way. Shin calls this feature of Peirce's graphs the "Multiple Carving Principle,"63 and praises it for some of the same reasons as Macbeth praises Frege's notation:

> Importantly, in the Alpha system we *see* logical equivalence. It is more efficient to see that the resulting graphs are the same graphs than to find a deduction sequence from one sentence to the other. . . . EG's Alpha system has fewer syntactic devices than propositional languages, but without suffering from the inconvenience of a symbolic system with only two connectives.64

Thus Peirce like Frege saw that some graphical logical notations enable their users to *see* logical relations not clearly capturable in linear form. Relatedly, he also recognized the rich potential for creative choice in deductive inference, and claimed that it derived from creative *observation*:

> It has long been a puzzle how it could be that, on the one hand, mathematics is purely deductive in its nature, and draws its conclusions apodictically, while on the other hand, it presents as rich and apparently unending a series of surprising discoveries as any observational science. The truth, however, appears to be that all deductive reasoning, even simple syllogism, involves an element of observation; namely, deduction consists in constructing an icon or diagram the relations of whose parts shall present a complete analogy with those of the parts of the object of reasoning, of experimenting upon this image in the imagination, and of observing the result so as to discover unnoticed and hidden relations among the parts.65

However Peirce arguably went further than Frege in recognizing a distinction between a kind of deduction that is creative and a kind that is not, and seeking to give a principled account of the difference. To this end he distinguished between 'theorematic' vs 'corrollarial' deduction. What specifically distinguishes the former from the latter is a step whereby one *adds new material to the graph* and then experiments on it. An example (cited by Jay Zeman) is Euclid's proof that the interior angles of a triangle total to 180 degrees:

> Let us then ask how we go about proving a basic but non-trivial proposition of Euclidian geometry. . . . So long as we just look at the triangle, making no changes in our diagram, we also make no progress in our proof. But when we move to the construction of a line parallel to a base through the opposite vertex, we see that propositions involving parallel lines solve the problem. The construction is by no means implied by the problem or by the postulates of geometry, but it is permitted by them.66
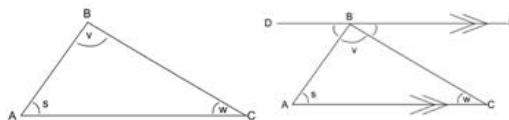
Figures ©New Zealand Ministry of Education, Wellington, New Zealand. Obtained from http://www.nzmaths.co.nz/geometry/shape/anglesetc.aspx.

It has been argued that what Kant was trying to express by saying that mathematics is synthetic was really that it consists in theorematic rather than corrollarial deduction.67

7. Is Iconic Logic Merely of Heuristic Value?

Our key claims concerning *essential iconicity* were:

EssIc2: Some *specific terms* have an irreducibly iconic dimension to their signification.

EssIc3: Some *propositions* have an irreducibly iconic dimension to their signification.

EssIc4: Some *arguments* have an irreducibly iconic dimension to their signification.

Considering EssIc4 first, do Frege and Peirce's notations show that it is true? One might argue that although the iconic features of these notations render them easier to work with, or perhaps useful to teach logic, nothing new is *provable* in them—and thus the iconicity is not *essential*.

This raises interesting issues about the role of formal logic—is the main or sole role of a formal logic system to prove as many new results as possible? Also, what do we mean by 'provable'? A distinction may be made between:

i) 'Strict provability.' There are proofs performable using (at least some) icons which could not be proven in a system which only uses indices and symbols—no matter how complex the proof.

ii) 'Likely provability.' There are proofs performable using (at least some) icons which *could* be proven in a system which only uses indices and symbols, but the proofs would be so complex, long, or otherwise difficult to think about that logicians would be more likely to discover the iconic proofs.

If it is asserted, 'nothing new is provable in graphical logical notations,' and meaning i), the claim is that any logical structure expressed iconically could be expressed entirely by means of indices and symbols. *But could it?* Lewis Carroll's well-known fable of Achilles and the Tortoise[68] is pertinent here. In the fable, famously, the two mythical racers contemplate the following propositions:

(A) Things that are equal to the same are equal to each other.

(B) The two sides of this Triangle are things that are equal to the same.

(Z) The two sides of this Triangle are equal to each other.

The Tortoise asks Achilles what he would say to someone who claims that he accepts A) and B) to be true, but not Z). He invites Achilles to imagine that he (the Tortoise) is such a person and to "force him, logically, to accept Z) as true." This is something the Tortoise *should* of course accept, as Z) is in fact entailed by A) and B). However Achilles finds he has surprising trouble achieving this task. He devises another conditional, C), to express what he sees as manifestly true and as missed by the Tortoise:

(C) If A and B are true, Z must be true.

He states C) to the Tortoise. Interestingly, the Tortoise asks him to write it down. Once Achilles has done so, the Tortoise asks what difference the writing on the paper makes to what he should do (specifically, re. inferring Z)), even if he accepts the truth of A) and B), because he just doesn't see it. Achilles is once again dumbfounded and is forced to resort to the further conditional D):

(D) If A and B and C are true, Z must be true.

The Tortoise of course asks him to write down D), and then refuses to act on it by performing the inference from A), B) and C) to Z). The two sink into a manifest infinite regress, with the Tortoise still unconvinced.

What is missing? What is the Tortoise not 'getting' (or pretending not to)? Arguably (once again) *a structural relationship*. This time, however, the structural relationship somehow connects a conditional sentence written on a page to an actual inference, which is an action. (The structural relationship thus may also be referred to as a 'norm'). If one pauses and thinks about this for a moment, it is rather amazing. How do perceived structures lead to *actions*? What is this "hardness of the iconic must"? Those who understand how to use written conditionals know how to 'see' the necessary connection between written conditional and inference-act, but the Tortoise can be understood as rhetorically highlighting a logical gap between a logical diagram and our seeing how to use it by refusing to see and use it himself.[69] There are links here to Wittgenstein's rule-following prob-

lem, insofar as Wittgenstein uses a similar feigned incompetence to highlight the logical gap between past uses of a rule and its future interpretation, and insofar as it seems that, rather bafflingly, there is nothing one can do to force him to see what he is missing.[70]

Brandom wrote that if expressivism is correct, "the explicit may not be specifiable apart from consideration of what is made explicit."[71] The insight seems to hold in this case, for if the Tortoise does not have the *practice* of Modus Ponens (as he appears not to, or pretends not to), Achilles cannot 'specify' to him how to attain that implicit knowledge of how to act merely by further explicit words in his rapidly filling notebook. It should be obvious that what is true for Modus Ponens may be generalized to all argument forms, and the norms by means of which we understand what to *do* with them.

Thus EssIc4 is true, and true in a stronger form:

EssIc4*: *All* arguments have an irreducibly iconic dimension to their signification.

From this it follows that in the Peircean context, the phrase "symbolic logic" is something of a misnomer. *All* representation of logical structure is iconic. Consider for instance the following argument in algebraic logic:

$$\forall x \, (Hx \supset Mx), Hs \; \therefore \; Ms$$

We 'see' the validity of this argument by a process akin to mentally substituting Hs into the conditional (universally instantiated) and obtaining Ms via Modus Ponens (given that we know how to use it). Concerning algebra, Peirce writes:

> [T]he very idea of the art is that it presents formulae which can be manipulated, and that by observing the effects of such manipulation we find properties not to be otherwise discerned. In such manipulation, we are guided by previous discoveries which are embodied in general formulae. These are patterns which we have the right to imitate in our procedure, and are the *icons par excellence* of algebra.[72]

This is very different to how we understand symbols, because our algebraic manipulations are at least in part dictated by the structure of the algebraic patterns themselves, (and thus necessary) rather than dictated by convention (and thus arbitrary). Such reasoning is only possible with icons, as of the three sign-classes, only they possess internal structure. In this way, then *structural articulation may be understood to be the source of all necessity*. The "hardness of the iconic must" consists only in our unavoidable recognition of a structure as having the particular structure which it does in fact have. What else could it consist in? Those philosophers who worry (as many do) about "the place of normativity in a naturalistic world order"[73] might do well to look further here. One of the few to suggest a positive solution to this issue of the source and authority of logical normativity is Brandom. He argues that Kant's concept of positive freedom holds the key, insofar as it teaches that binding oneself to logical norms may paradoxically result in a bonanza of positive expressive freedom—a freedom to say things which would be impossible without the scaffolding which logic's structural articulation provides.[74]

But one might protest, surely conventions might be *devised* to capture the rules of algebra, and this would enable us to signify them symbolically? Against this Peirce argues that such symbolic signification could only be parasitic on a prior iconic understanding:

> [A] general formula, such as $(x+y)z = xz+yz$ . . . [might] be replaced by an abstractly stated rule (say that multiplication is distributive); but no application could be made of such an abstract statement without translating it into a sensible image. [75]

Of course the point just made with respect to algebraic logic holds equally for arguments in ordinary English, for instance:

All human beings are mortal

Socrates is a human being

Therefore, Socrates is mortal

Again, one sees that this is valid by some thought process of the nature of seeing Socrates as somehow 'included' in some kind of conglomeration of human beings, who exemplify the property of mortality, thereby rendering it the case that Socrates *must* be mortal. That even *this* qualifies as experimenting on a mental diagram can be seen by the use of the key word 'must.'

To sum up, then, the difference between arguments written in English, in standard quantificational logic, and in Peirce's or Frege's graphs, is merely a matter of how *perspicuous* the icons are,[76] in other words, how much of the *use* of these notations is 'forced' via the constraints of their structure. Thus in formal logic, the true distinction should not be drawn between 'symbolic' and 'iconic,' but between 'algebraic' and 'graphical' systems. From this it follows that Peirce's and Frege's graphs cannot prove arguments that are un-provable in non-iconic logical systems, as there are no such systems. Thus the graphs can deliver at most provability in the sense of ii) ('Likely Provability'). However given the fact that all logical structure is iconic, this benefit should not be underestimated. Peirce claimed:

> The aid that the system of graphs . . . affords to the process of logical analysis, by virtue of its own analytical purity, is surprisingly great, and reaches further than one would dream. Taught to boys and girls before grammar, to the point of thorough familiarization, it would aid them through all their lives.[77]

8. Iconic Propositions, Iconic Terms

EssIc3 is now looking trivially true, given that a conditional proposition is, functionally speaking, a mini-argument. However, iconic propositional structure is not restricted to conditionals. Turning once again to the early Wittgenstein, the Picture Theory of Meaning highlights that a meaningful proposition is not just a concatenation of concepts. For instance,

it matters which concepts serve as predicate and which as argument(s). The order of the arguments also matters greatly.

Wittgenstein notes that a proposition's concepts must be arranged in an appropriate structure (in our terms: icon), in order that it can be *seen* what is the case if it is true ("It is only insofar as a proposition is logically articulated that it is a picture of a situation."[78]) It is necessary that we be able to 'see' what is the case *if* a proposition is true, for us to be able to judge *whether* a proposition is true ("A proposition constructs a world with the help of logical scaffolding, so that one can actually see from the proposition how everything stands logically *if* it is true"[79]). This 'picturing' also explains how we are able to understand and reason with false propositions,[80] and it is hard to think of how we would explain this any other way.

Concepts must also be arranged in an appropriate icon to guarantee that they picture a *genuinely possible* state of affairs, rather than nonsense. For many possible concatenations of concepts are in fact nonsensical. With these insights Wittgenstein effectively devastated Russell's 1913 theory of knowledge which was based on analyzing a judgment in terms of a mere list of concepts. For instance, the logical form of "Othello judges that Desdemona loves Cassio" was analysed by Russell as: Judges(Othello, Desdemona, Cassio, loves), whereas previously he had analysed it as a relation between a subject and a whole proposition (whose structural integration was thus a given).81 As Wittgenstein puts it:

> Every right theory of judgment must make it impossible for me to judge that "this table penholders the book" (Russell's theory does not satisfy this requirement).[82]

"Table" "penholder," and "book" are all worthy concepts, but the putative judgment above makes no sense. But according to Russell's theory, it could be judged by someone.

Wittgenstein goes so far as to try to subsume entirely into a proposition's iconic structure its *predicates* (which led him to claim that he had disproven 'the reality of relations'), the logical *types* of its constituents and also its '*logical constants*':

> Symbols are not what they seem to be. In "aRb" "R" looks like a substantive but is not one. What symbolizes in "aRb" is that R occurs between *a* and *b*. . . . This is the first thing that indicates that there *may* not be logical constants.[83]

> [E]very theory of types must be rendered superfluous by a proper theory of symbolism.[84]

This aspect of the Picture Theory of Meaning has not been widely emulated—possibly because as mentioned earlier the posited iconic structure seems *necessarily* mysterious. However arguably the mystery arises from the juxtaposition of the Picture Theory with *logical atomism*, and the real problem lies with the latter. For it is logical atomism which leads Wittgenstein to see the separation between what can be 'said' and what can 'shown' as two entirely distinct camps of content. Whereas the earlier explication of expressivism stated that with a simple shift in quantifier scope one may claim simultaneously that every piece of content which is explicit ('said') relies crucially on some content which is not explicit ('shown'), *and* that every piece of content may be made explicit—or at least more explicit than it was before. Martin Lefebvre has pointed out that although after the *Tractatus* Wittgenstein abandoned the atomism that led him to see propositions as pictures composed of 'simple objects,' he maintained iconicity as a foundation of propositional representation in his later work where he turned to explicating language via rules and language games.[85] For what glues the multitude of scattered and disparate instantiations of adding into a 'plus rule,' or of checkmating into 'the game of chess,' but their *resemblance* to one another? Thus:

EssIc3*: All propositions have an irreducibly iconic dimension to their signification.

What then of terms? Surely *these* are language fragments sufficiently devoid of internal structure that they need not be iconic (though they obviously *can* be—consider for example *onomatopoeia*). Predicates will be considered first, and then singular terms. From a Peircean perspective, the meaning of predicates also must have an iconic dimension. This arises from the fact that, *pace* Quine and his many descendents, predicates do not just refer to (sets of) things, they enable *inferencing*. Christopher Hookway puts it thus:

> Peirce often tells us that predicates, in natural and artificial languages, function as diagrams. This is reflected in the fact that we can . . . advance our knowledge further by 'experimenting' on sentences in accord with logical laws. This exploits the fact that the inferential relations between sentences can be analogous to real elements between elements of reality, norms of inference matching laws of nature.[86]

Such a 'conceptual icon' is schematic, but it is no less useful for that (in fact it is *more* useful for that). Consider for instance the predicate "is gold." One does not understand it unless one can make at least *some* inferences concerning such matters as its typical behavior and appearance. Moreover, this inferential pattern must be *distinctive* enough to make a 'conceptual signature' which can reliably distinguish gold from other elements. Wittgenstein would call this conceptual signature a 'physiognomy.' The insight is of course not restricted to scientific predicates. Consider Perry's common-or-garden predicate, "is making a mess." One doesn't understand this unless one can make certain inferences—at least that its instantiators are in some way creating greater disorder in their surroundings of a kind likely to attract disapproval.

Discussion of the claim that propositional structure is iconic showed that it explains how

one is able to 'see' what would be the case if a proposition were true or false. If predicates are also iconic, what does that explain one's 'seeing'? Unlike propositions, not complete states of affairs (which either obtain or do not), but rather an open-ended multiplicity of possible states of affairs which partially overlap at relevant general features. To put the same point another way: unlike propositions, predicates are not pictures so much as *parts* of pictures. But a part of a picture is still iconic, by virtue of the way in which we understand it—by recognizing which picture(s) it is a part of. In science this 'predicate-seeing' is vital to explain the generation of new *hypotheses*. In Peircean terms, new hypotheses can be understood as adding new 'lines' to the mental diagram which is a scientific theory, enabling new experiments to be performed upon it.

Thus all predicates signify iconically. What then of singular terms? Surely *they* cannot all be icons? *Definite descriptions* will of course be iconic insofar as they rely on predicates to definitely describe what it is that they definitely describe. But surely there must be some pure pointing going on in language? What about *proper names*? It was noted earlier that although these may function indexically at some initial baptism, if used repeatedly, a general convention is established to refer to that individual by that term, and they become symbols. Could these not be an entirely iconicity-free pure index/symbol combination? They may be, but one must ask: *how are these names recognized at future uses* (in order to become symbols)? Usually by the pattern of the letters or sounds which constitute the name. And a *pattern* is of course an icon. Thus Peirce writes:

> 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 hav-ing been acquired, it becomes a Symbol whose Interpretant represents it as an Icon of an Index of the Individual named.[87]

The aforementioned excessive focus of analytic philosophers on symbols, which signify via arbitrary convention, has led them to treat 'material qualities' of a sign, such as a word's letters, as entirely irrelevant to its signification. But of course this way of thinking is inappropriate to the icon. Once again these insights seem also to have been glimpsed by Wittgenstein, with his unmatched sensitivity to the phenomenology of language-use (*albeit* somewhat fancifully, perhaps):

> While any word . . . may have a different character in different contexts, all the same there is one character—a face—that it always has. It looks at us.[88]

If Peirce's definition of the icon is recalled, what is required for a term to be entirely iconicity-free is that it not refer to its object by means of *any of its qualities whatsoever*. This is a stringent request. As we have just seen, it will not be satisfied by any name or noun which is distinguished by a unique word. Some cases of signification do approach this condition, however. Consider for example the word 'that' used by someone pointing a finger near an object and saying, "Look at that!"[89] But such uses are as rare as Russell's 'logically proper names.' Therefore we may assert:

> EssIc2*: *Almost all* terms have an irreducibly iconic dimension to their signification.

6. Conclusion

Thus EssIc2, EssIc3 and EssIc4 are all true, and true in stronger form than initially proposed. The essential indexicals literature demonstrated to analytic philosophers that the real connection between a discourse and a world, that determines 'what we're talking about,' cannot always be made explicit in that discourse. This fractured modal logic into at least two dimensions insofar as grasp of the

'character' of a proposition leaves one blind to its 'content' without resolution of the objects of its indexicals. The response has been to add to the interpretation function extra bells and whistles that locate actual speakers, places, and times in all worlds (at an appropriate, context-dependent level of fine-grainedness, the context on which this is dependent being somehow identified in a non-circular way), and serve them up somehow as part of the 'content' of propositions. Now we have just seen that iconicity is also 'essential,' and cannot be made entirely explicit (although it can be made more or less *visible*, in contrast to the pure pointing function of the index).

What the implications of this should be for standard analytic semantics will need much further work to determine. However, for now we can conclude that Brandom's expressivism is further vindicated in its claim that not all semantics can be made explicit. Earlier it was asked whether Wittgenstein's Picture Theory of Meaning might belong in the expressivist tradition, and thus our understanding of "making it explicit" might be extended from a saying of what was previously only *done*, to a saying of what was previously only *seen*. It can now be seen that the Picture Theory does indeed belong in that tradition. An interesting neglected continuity between it and Wittgenstein's later work on rules is also now visible, insofar as the resemblance of the different instantiations of a rule or of a family-resemblance concept to one another cannot be reductively analysed.

But at the same time it can be seen that this is not really an *extension* of expressivism. For as has been argued, in working with iconic signs the mind is not passive, but active. The rational mind binds itself to logical structure, and must respect it, but at the same time it chooses to analyze, to make explicit and to use these icons in a host of different ways, not all of which are cognizable together. As Wittgenstein said, all seeing is seeing-as. And of course every 'seeing-as' presupposes the possibility of a 'seeing-not-as.' In this way, then, a seeing *is* a doing. As Wittgenstein also noted:

> An aspect is subject to the will. If something appears blue to me, I cannot see it red, and it makes no sense to say "See it red"; whereas it does make sense to say, "See it as . . ." And that the aspect is voluntary (at least to a certain extent) seems essential to it.[90]

The essentiality of the icon is thus revealed as creative inferential *choices* somehow at the same time rendered *necessary* by a pure dream.[91]

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<div align="center">NOTES</div>

1.   See for example, David Savan, *An Introduction to C.S. Peirce's Full System of Semeiotic* (Toronto: Toronto Semiotic Circle, 1988); James Lizska, *A General Introduction to the Semeiotic of Charles S. Peirce* (Bloomington: Indiana University Press, 1996); T. L. Short, *Peirce's Theory of Signs* (Cambridge: Cambridge University Press, 1997).

2.   Peirce experimented with many alternative definitions of 'icon,' 'index,' and 'symbol' through his career; for example, *Collected Papers* [henceforth *CP*] (Cambridge, Mass.: Harvard University Press, 1931–1958), §§2.304, 2.92, 2.247–249, 3.363, 4.531, 5.73–74, 8.335.

3.   For instance, ibid., §§3.363, 3.641.

4.   Ibid., §2.281.

5.   Charles Peirce, *Essential Peirce*, vol. 2 [henceforth: *EP2*], ed. N. Houser and C. Kloesel (Indianapolis: Indiana University Press, 1998), p. 307. See also *CP*, §§2.247, 2.276.

6. This analogy between 'physical' and 'linguistic' indexing received strenuous criticism from early Peirce scholars steeped in analytic philosophy. See, for instance, Arthur Burks, "Icon, Index and Symbol," *Philosophy and Phenomenological Research*, vol. 9 (1949), pp. 673–689; and Thomas A. Goudge, "Peirce's Index," *Transactions of the Charles S. Peirce Society*, vol. 1 (1965).

7. *CP*, §3.362.

8. Although he did move in that direction. For details, see Ahti Pietarinen, "Peirce's Contributions to Possible-Worlds Semantics," *Studia Logica*, vol. 82 (2006), pp. 345–369.

9. For more on rigid designation viewed through the lens of Peircean semeiotic, see Catherine Legg, "The Meaning of Meaning-Fallibilism," *Axiomathes*, vol. 15 (2005), pp. 293–318.

10. Bertrand Russell, "Knowledge by Acquaintance and Knowledge by Description" (1917), reprinted in *Mysticism and Logic* (Garden City, N.Y.: Doubleday, 1957).

11. *CP*, §2.329.

12. John Perry, "Indexicals, Contexts and Unarticulated Constituents," in *Proceedings of the 1995 CSLI-Armsterdam Logic, Language and Computation Conference* (Stanford, Calif.: CSLI Publications, 1998).

13. *CP*, §3.360.

14. Ibid., §3.460.

15. See, for instance, Robert Brandom, *Articulating Reasons : An Introduction to Inferentialism* (Cambridge, Mass.: Harvard University Press, 2000), p. 46.

16. *CP*, §3.362.

17. *EP2*, pp. 4–11.

18. Ibid., p. 10.

19. Most prominently, John Perry, "The Problem of the Essential Indexical," *Noûs*, vol. 13 (1979), pp. 3–21; David Kaplan, "Demonstratives: An Essay on the Semantics, Logic, Metaphysics and Epistemology of Demonstratives," in *Themes from Kaplan* (Oxford: Oxford Universitiy Press, 1989). Earlier work deserves mention, however; for instance, Yehoshua Bar-Hillel, "Indexical Expressions," *Mind*, New Series, vol. 63 (1954), pp. 359–379; Hector-Neri Castaneda, "Indicators and Quasi-Indicators," *American Philosophical Quarterly*, vol. 4 (1967), pp. 85–100.

20. Perry, "The Problem of the Essential Indexical," p. 6.

21. It might be protested that it is wrong to ask whether Fregean senses should be regarded as symbols, indices or icons at all, as a sign's sense is a different entity than the sign itself, and should not be treated as a sign in its own right. However from the Peircean perspective, insofar as a Sinn is *understood* it must be a sign. To put the same point another way, one can make a case that Frege's concept of Sinn plays much the same theoretical role as Peirce's concept of the interpretant. (This is argued, for instance, in Legg, "The Meaning of Meaning-Fallibilism.") And the interpretant is explicitly conceived as a further sign. I am indebted to Danielle Macbeth for discussions on this point.

22. Perry, "The Problem of the Essential Indexical," p. 7.

23. Rather crudely following Alfred Tarski, "The Concept of Truth in the Languages of the Deductive Sciences," *Prace Towarzystwa Naukowego Warszawskiego, Wydzial III Nauk Matematyczno-Fizycznych*, vol. 34 (1933).

24. Kaplan, "Demonstratives" and "Afterthoughts," in *Themes from Kaplan*.

25. It's worth noting that Perry wishes to avoid making sentences true only at a times and places, and his solution to the essential indexical problem is rather different to Kaplan's, involving a complex

distinction between 'belief-states' and 'objects of belief.' However Kaplan's arguably less intensional solution has been more popular.

26. Perry, "The Problem of the Essential Indexical," p. 3.

27. Many more possibilities have been considered—the Stanford Encyclopedia entry, "Indexicals" (David Braun, "Indexicals." *Stanford Encyclopedia of Philosophy*. Available at http://plato.stanford .edu/entries/indexicals/, accessed March 10, 2008) also mentions the following: 'we,' 'ours,' 'they,' 'theirs,' 'these,' propositional attitude verbs such as 'believe' and 'know,' adjectives such as 'rich' and 'local,' and vague expressions , ending by noting that it is very difficult to draw a principled boundary around terms that are indexical and terms that are not.

28. Perry, "The Problem of the Essential Indexical," pp. 4–5.

29. Ibid., p. 20.

30. Interestingly, one might argue from the Peircean perspective that insofar as, as we have seen, Perry has an understanding of concepts as symbols—in asking for a *conceptual* ingredient to account for indexicality, perhaps he is asking for something intrinsically incoherent.

31. Although it is an interesting question in its own right.

32. Don Roberts, *The Existential Graphs of Charles S. Peirce* (The Hague: Mouton, 1973), p. 11.

33. Brandom, *Articulating Reasons*, p. 8. See also his *Making It Explicit: Reasoning, Representing, and Discursive Commitment* (Cambridge, Mass.: Harvard University Press, 1998), pp. 92–93.

34. Brandom, *Articulating Reasons*, p. 8.

35. Robert Brandom, "When Philosophy Paints Its Blue on Grey: Irony and the Pragmatist Enlightenment," *Boundary2*, vol. 29 (2002), p. 4.

36. Brandom, *Articulating Reasons*, pp. 8–9.

37. Though one might conceivably argue that one obtains *more* understanding of a sonata if one is musically literate—a conductor, say—and reads the score.

38. Brandom, *Articulating Reasons*, pp. 56–57.

39. Ibid, p. 53. Also see Brandom, *Making It Explicit*, p. 22.

40. "A picture cannot . . . depict its pictorial form: it displays it." Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, trans. D. F. Pears and B. F. McGuinness (London: Routledge, 1961), §2.172.

41. Danielle Macbeth, *Frege's Logic* (Cambridge, Mass.: Harvard University Press, 2005).

42. John MacFarlane, "Frege, Kant, and the Logic in Logicism," *Philosophical Review*, vol. 111 (2002), pp. 25–66.

43. Ed Zalta, "Gottlob Frege," *Stanford Encyclopedia of Philosophy*, http://plato.stanford.edu/entries/ frege/#FreConLog. Accessed May 1, 2008.

44. Kant (A51/B75), cited in MacFarlane, "Frege, Kant, and the Logic in Logicism," p. 28.

45. Macbeth, *Frege's Logic*, p. 47

46. Ibid., p. 51.

47. Ibid.

48. Ibid., p. 49.

49. Ibid, p. 52.

50. Michael Dummett, "More About Thoughts," *Notre Dame Journal of Formal Logic*, vol. 30 (1988), p. 6.

51. Ibid.

52. Macbeth, *Frege's Logic*, p. 45. This claim is disputed by Dale Jacquette in "Critical Notice of Danielle Macbeth: Frege's Logic," *Canadian Journal of Philosophy*, vol. 36 (2006), p. 612. Jacquette claims that in sentences where the negation sign is in the leftmost place, that negation will always function as the main connective, but he seems to have missed the possibility of higher-order analysis.

53. Macbeth, *Frege's Logic*, p. 66.

54. Ibid., p. 46.

55. Ibid., p. 48.

56. A proper discussion of this claim would require unpacking what exactly both Kant and Frege meant by 'logic.' For a careful discussion of this, see MacFarlane, "Frege, Kant, and the Logic in Logicism." See also Sun-Joo Shin, "Kant's Syntheticity Revisited by Peirce," *Synthese* vol. 113 (1997), pp. 1–41.

57. Cited in Ed Zalta, "Frege's Logic, Theorem and Foundations for Arithmetic," *Stanford Encyclopedia of Philosophy*. Available at http://plato.stanford.edu/entries/frege-logic/ (accessed May 1, 2008). Also in play in Frege's rejection of 'intuition' in logic is an issue concerning whether 'constructions' in reasoning from concepts can only take place privately in the mind or might be scaffolded (on the page) by logical notation. This distinction is orthogonal to the analytic-synthetic distinction. I am indebted to Danielle Macbeth for pointing this out.

58. Charles Peirce, *CP*, 4.561n.

59. For instance, it is now well-known that Peirce's *alpha graphs* are equivalent to propositional logic and his *beta graphs* to first-order predicate logic with identity (Don Roberts, *The Existential Graphs of Charles S. Peirce*; Sun-Joo Shin, *The Iconic Logic of Peirce's Graphs* [Cambridge, Mass.: MIT Press, 2002]). Soundness and completeness proofs have been provided for alpha and beta (e.g., Roberts, *The Existential Graphs of Charles S. Peirce*, pp. 139–151). The uncompleted *gamma graphs*, however, where Peirce was trying for a higher-order and modal logic using new symbols for 'hypostatic' abstraction, have received much less attention, as have the even later, also unfinished, '*tinctured graphs*,' where he attempted a more subtle modal logic where one might affirm or negate possibilities of different modal 'flavors' (e.g., alethic, epistemic, deontic), distinguished via different colors and textures.

60. *CP*, §4.239

61. Ibid., §4.373.

62. Sun-Joo Shin, *The Iconic Logic of Peirce's Graphs*, p. 52.

63. Ibid., p. 77.

64. Ibid., p. 97. She does point out that the same graph is 'sufficient but not necessary' for logical equivalence. But the lack of necessity is only because the sentence-letters can be different.

65. *CP*, §3.363.

66. Jay Zeman, "Peirce's Philosophy of Logic," *Transactions of the Charles S. Peirce Society*, vol. 22 (1986), p. 17.

67. Jaakko Hintikka, "C. S. Peirce's 'First Real Discovery' and its Contemporary Relevance," *Monist*, vol. 63 (1980), pp. 304–315; Sun-Joo Shin, "Kant's Syntheticity Revisited by Peirce," although some of Kant's specific examples of synthetic inference turn out to be corrollarial in Peirce's terms once one has access to polyadic logic. One example is the famous '7+5=12.'

68. Lewis Carroll, "What the Tortoise Said to Achilles," *Mind*, vol. 104 (1995), pp. 691–693. Robert Brandom has already highlighted the expressivist morals which may be drawn from this charming piece, for example, in *Making It Explicit*, pp. 22–3.

69. In a related discussion, Robert Brandom has argued that there is an ambiguity between predication considered qua "structural way of building up new judgable contents" and qua "kind of doing that has the significance of endorsing such contents." Robert Brandom, "Kantian Lessons about Mind, Meaning and Rationality," *Philosophical Topics*, vol. 34 (2006), p. 5.

70. A Peircean view of Wittgenstein's discussion of rule-following is presented in Catherine Legg, "This is Simply What I Do," *Philosophy and Phenomenological Research*, vol. 66 (2003), pp. 58–80, where the mind's perception of how a rule should be continued is presented in Peircean categorical terms, somewhat airily, as 'the Firstness of Thirdness.' It can now be seen that this airy categorical iteration may be further explicated as *iconicity*.

71. Brandom, *Articulating Reasons*, pp. 8–9.

72. *CP*, 3.364.

73. For a paradigmatic example of such 'naturalistic worrying,' see Huw Price, "Naturalism and the Fate of the M-Worlds," *Proceedings of the Aristotelian Society*, vol. 71 supp. (1997), pp. 247–267.

74. Brandom, "Kantian Lessons."

75. *CP*, §3.364.

76. See also Christopher Hookway, "Peirce on Icons and Cognition," in *Conceptual Structures: Knowledge Architectures for Smart Applications* (Berlin: Springer, 2007), p. 2.

77. *CP*, §4.619.

78. Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, §4.032.

79. Ibid., §4.023.

80. Ibid.

81. For a good account of this episode, see Peter Hanks, "How Wittgenstein Defeated Russell's Multiple-Relation Theory of Judgment," *Synthese*, vol. 154 (2007), pp. 121–146.

82. Ibid., p. 128.

83. Ludwig Wittgenstein, *Notebooks 1914–16*, trans. G. E. M. Anscombe (New York: Harper, 1961), p. 98.

84. Ibid., p. 121.

85. Martin Lefebvre, "De Quelques Airs de Famille: Remarques sur le Langage et la Ressemblance chez Peirce et Wittgenstein" (unpublished manuscript), p. 3.

86. Hookway, "Peirce on Icons and Cognition," p. 5.

87. *EP2*, p.286.

88. Ludwig Wittgenstein, *Remarks on the Philosophy of Psychology*, trans. G. E. M. Anscombe, ed. G. E. M. Anscombe and G. H. von Wright (Oxford: Basil Blackwell, 1980), I, §322.

89. Albert Atkin discusses this example in "Peirce on the Index and Indexical Reference," *Transactions of the Charles S. Peirce Society*, vol. 61 (2005), p. 182. He points out that Peirce distinguished between "informational" and "degenerate" indices insofar as only the former manifest "iconic involvement." The term 'that' as used above is an example of the latter.

90. Ludwig Wittgenstein, *Remarks on the Philosophy of Psychology*, I, §899.

91. I am indebted to Robert Brandom, Sally-Ann Parker-Ryan, and particularly Danielle Macbeth for helpful feedback which improved this paper.

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