

# Diagrams as centerpiece for an enactivist epistemology

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**Summary.** In the present work I will examine two semiotic contributions, Legg (2021) and Caravà (2019) respectively, that explore the possible connection between semiotics and enactivism. Both attempt to offer a semiotic interpretation of the enactivist theory of perception and cognition, with the aim of showing how semiotics can contribute to the debate on mental representations. I will argue that Legg's proposal, based on the Peircean concept of the *dicisign*, assigns to basic cognition conditions that are not necessary, from the point of view of enactivism. Caravà's, in turn, assigns non-sufficient conditions. I will argue that if we want to semiotically interpret the enactivist framework the concept that describes necessary and sufficient conditions is that of the diagram.

**Keywords** cognitive semiotics; enactivism; affordances; diagrams; teleosemiotics.

## Introduction

The relationship between semiotics and cognitive science is complex. Umberto Eco for example wondered whether semiotics is part of the cognitive sciences or vice versa (1997: 2). On the one hand, there are arguments that pure semiotics should do without taking into consideration minds and reality (Daddesio 1995: 19).

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Cognitive semiotics, on the other hand, was born with the explicit intention of connecting semiotics' tools and problems with those of cognitive science (Sonesson 2012). In the present work I will examine two recent papers, Legg (2021) and Caravà (2019) respectively, that explore the possible connection between semiotics and enactivism. Both aim at offering a semiotic interpretation of the enactivist theory of cognition by showing how semiotics can contribute to the debate on mental representations. Legg proposes to interpret the enactivist theory as instating a naturalised propositional structure (the double structure of a *dicisign*, in Peirce's terminology), while Caravà proposes an externalist and extended interpretation according to which in basic cognition we do not deploy mental representations but external indexical signs. I will first show some problems with these proposals; then I will offer an alternative interpretation based instead on another Peircean notion, diagrams, which, as I will argue, possess necessary and sufficient conditions to explain basic cognition (see Paolucci 2021 for a similar inquiry based on diagrams).

To be sure, I am not saying that enactivists are right about the mind, nor therefore that semiotics should abandon other approaches to cognitive semiotics. While it is interesting to explore how semiotics can contribute to the debate on mental representations, it is also interesting for semiotics to explore what happens to its theory if we assume an enactivism-inspired anti-representationalist, monist framework on the mind. The present work is intended as a first step in this direction.

## **Dicisigns are not necessary**

Legg's explicit intent (2021: 14763) is to «place *dicisigns* theory within an enactivist frame».

On the one hand, Legg as a pragmatist shares with enactivism the anti-intellectualist stance. On the other, she thinks semiotics can contribute to solving the Hard Problem of Content through a «broadened understanding» of the concept of representation.

Legg's starting point is what she calls the *information processing challenge* of enactivism (Legg 2021: 14753). Although there are several versions of enactivism (Ward et al. 2017; Hutto 2023), a core that unites all versions is the anti-representationalist stance. As is well known (Gardner 1985), the cognitive sciences arose in opposition to behaviourism, with the explicit intent of working directly on the cognitive processes that mediate between sensory inputs and behavioural outputs through the mind-computer metaphor. According to the latter, just as the computer is the hardware on which software-programs are instantiated, so the brain is the hardware that instantiates the mind (but see Piccinini 2020 for a critique of this distinction). According to this approach, the body and the environment are only sources of inputs and «the arena for outputs» (Schlicht 2023: 108), a model that Susan Hurley called the "sandwich model" (1998). Moreover, it is a common assumption in the cognitivist paradigm that mental computations operate over mental representations that stand for objects or states of affairs in the world (see Sterelny 1986 for a discussion on representation's formats). In contrast, 4E theories (or the "situated paradigm", as Schlicht calls it) are anti-representationalist. The idea is that in order to explain cognition it is not necessary to postulate mental representations that supervene the physical and that the body, the brain and the environment constitute "sensorimotor contingencies" (O'Regan, Noë 2001) that irreducibly determine how cognition is performed. «Competence is prior to content», as Hutto (2011) would put it, and we could add, using the famous Chomskyan dichotomy, that performance is prior to competence.

Having excluded representations from cognition the information processing challenge asks «how with no notion of mental content whatsoever (at least for basic minds), one might account for cognitively sophisticated capacities» (Legg 2021: 14754). Hence, it brings forth the hard problem of content since these theories cannot presuppose what needs to be explained.

Before discussing Legg's discussion of teleosemiotics (Hutto, Miyn 2013; Hutto, Satne 2015), it is interesting to mention Hutto and

Myin's criticism of teleofunctionalism as a possible solution to the problem. According to teleofunctionalism, a possible candidate for solving the problem is to consider certain biological properties of an interpreter (a frog, a fly or a human) as representational because evolutionary history has selected them to perform the function of telling how things are in the world. For Hutto and Myin, this approach fails because biological functions still lack what they call the special properties of representations, i.e. must convey full-fledge content, have truth values, and referential and inferential capacities. Hence, the tree's rings are not representations of the age of the tree because the rings only provide information-as-covariance, not actual semantic information that says something true or false about the tree. Thus: «[I]ogic dictates that if there is no informational content in the world, then there is no informational content in the world *to be acquired by minds*» (Hutto, Myin 2013: 72–73).

Legg's move is to confirm the premise ("there is no information in the world") but reject the conclusion ("there is no information that minds can acquire"). For my part, I will embrace the extended notion of representation proposed by Legg (more on this presently), on which her argument is based, but then argue that the premise is too strong and therefore false for external representations. I think that neural patterns, courses of action of an organism and biological functions are meaningful representations. The question, however, will be to establish *for whom* a representation is a representation: whether they are internal representations meaningful to the organism itself, or external semiotic representations meaningful to the third person perspective. As we will see, according to Legg habits are internal interpretations meaningful to the organism itself.

Peirce's lesson on representations is that for something to be a representation it must always involve three things: not only a sign-vehicle and its meaning, according to the formula *aliquid stat pro aliquo*, but also the interpreter for whom a given representation stands in place of something else<sup>1</sup>. In Peirce's semiotics, moreover, the "for whom" side is captured by the notion of the interpretant, because the way one reacts to the sign, which is always a public

gesture, can itself become a sign that stands in place of something else for someone (and this potentially infinite process is what Peirce calls interpretation). From this perspective, an external representation is a representation in which the sign-vehicle and the interpreter are two different things in the world; an internal (or mental) representation is a representation in which the sign-vehicle and the interpreter are the same thing (or, where the sign-vehicle is internal to the interpreting organism). In this sense, in my reading, enactivism is most and foremost (though sometimes not only) internal anti-representationalism (for a discussion on mental representations see Smortchkova et al. 2020; Shea 2018; Ramsey 2007).

The following is Legg's argument. The pragmatic maxim, according to which the meaning of something can be expressed in a series of hypothetical conditionals that define the practical consequences of the object under analysis, is not only consistent with, but also a good description of the enactivist theory of cognition. An example is Peirce's analysis of lithium<sup>2</sup>. As Peirce himself noted, his analysis has the peculiarity of establishing «what the word lithium denotes by prescribing what you are to do in order to gain a perceptual acquaintance with the object of the word» (Peirce CP 2.330). Each of the conditionals is taken to represent the same epistemological structure. This is how Legg describes it:

I will consider these Peircean hypothetical conditionals [...] as essentially connecting three things: (1) a cue, (2) an act, (3) some schema of anticipated experience. (Legg 2021: 14759)

This semiotic based theory of knowledge is anti-Cartesian because for Peirce it is not internal mental representations that connect 1 and 2, as in cognitivism, but habits of response. According to Legg «habits ontologically bridge body-mind dualism» on the one hand, and «unlike ideas, habits also ontologically bridge the public-private distinction, insofar as they are simultaneously observable and introspectable» (Legg 2021: 14759-14769; on habits cf. Caruana, Testa 2021)<sup>3</sup>.

Legg argues that these bases of pragmatism are coherent with teleosemiotics. According to teleosemiotics, which is basically, as Hutto and Myin say, «teleosemantics without the semantic ambitions» (Hutto, Myin 2013: 78), an organism's actions are not mediated by internal intentional states that represent the world, but they do exhibit a *ur-intentionality* which «results from the targeted directedness of past organisms» (Hutto, Satne 2015: 531)<sup>4</sup>. According to teleosemiotics «the frog snaps its mouth at flies because it has evolved to eat them, but it also snaps at beebees because they trick the frog's fly-detecting mechanism, which has evolved in a beebee-free environment. Thus, the snapping frog cannot be said to truly represent "This is a fly"» (Legg 2021: 14757). Legg's problem is that this approach starts from too narrow a notion of representation, which leads teleosemiotics to oppose semantics and pragmatics too neatly. Legg's thesis is that the frog's response instantiates the clue-act-habit syntax seen above which, in turn, instantiates a particular logical-semiotic structure derivable from Peirce's doctrine of *dicisigns* (as reconstructed by Stjernfelt, 2014).

In Peirce's semiotics, *dicisigns* are the second category of the trichotomy that distinguishes signs in relation to their interpretant. Respectively: *rhemas*, *dicisigns* and *arguments* (or: term, proposition, argument). The peculiarity of Peirce's theory of propositions is its extension beyond the linguistic or conceptual. Gestures, images, diagrams, signs of various kinds, etc. can be part of a proposition (forming a *dicisign*). Stjernfelt (2014) reaches many important conclusions from this extended conception of propositions. Particularly important is *dicisigns'* double structure which consists in the co-localisation, as Stjernfelt calls it, of two signs, an index and an icon respectively (reproducing the subject-predicate structure of linguistic propositions), which enables the *dicisign* to say something about something. Peirce's favorite example is a portrait combined with a legend referring to the name of the person portrayed, where the portrait itself forms the iconic-predicative part while the legend forms the indicative-denotative part of the *dicisign*.

Legg's example is that of a woman taking the tram. Even this small event is a dicisign: the woman first perceives the tram arriving (cue-index part); as soon as the train stops, her habit of boarding is activated (habit-iconic part); then she gets on the tram (dicisign). Taking Hutto's example of the frog, then, the fly would be the cue-index, the habit of snapping the icon, the two together forming a dicisign. Thus, both the frog snapping, and the woman boarding would be representations, even though not linguistic or symbolic ones. See Stjernfelt: «the Dicisign doctrine [claims] there are quasi-propositions already in perception and that perception, consequently, involves "propositional stances". The same goes for externalized Dicisigns in books, pictures, computers and elsewhere which may display parts which are not exhaustible by concepts – such as gestures, images, diagrams etc.» (2014: 116, cited by Legg).

Now, the fact that there are quasi-propositions or dicisigns in perception, as Stjernfelt says, does not imply that it must be the habit of responding in a certain way that constitutes the iconic part of a dicisign. In fact, from the point of view of Peirce's semiotics, it would be much more natural to think of the habit as the symbolic part that holds together, by establishing the co-localisation, the two parts of the dicisign. Indeed, this is how Stjernfelt himself conceives the perception of a dicisign. In the case of the fireflies as *femefatales* (El-Hani et al. 2010), Stjernfelt and colleagues say that the *Photuris'* signal constitutes, at one and the same time, the iconic and indexical part of the dicisign perceived by the *Photinus*, indicating (falsely) that "there is a female *Photinus*" and the direction to follow (thus deceiving the *Photinus*)<sup>5</sup>. According to this interpretation, dicisigns are external representations in the sense defined above. Stjernfelt's point about perception was just to express that, having extended the notion of representation beyond the linguistic/conceptual, for Peirce (as Bellucci 2018 put it) it is inference to be always perceptual, not perception to be inferential, an interpretation of Peirce's logic that Legg herself has contributed to explore (Legg 2013).

On the contrary, to say that in basic cognition the habit of response plays the iconic part of a *dicisign* maintains a confusion between internal and external representations reintroducing the Helmholtzian theory of perception, opposite to Peirce's, according to which perception is inferential (i.e. mediated by concepts). In fact, Legg says, given that for Peirce the schema is a habit: *«when given a certain cue, an agent expects that if she performs a certain act, then a certain kind of experience will follow. We do this by observing that the posited experience schema may be understood as an iconic sign»* (Legg 2021: 14761). In this sense, Legg recovers internal iconic representations which generate the organism's lived experience. As Legg concludes:

In short: Hutto and Myin are quite correct that content does not lie in the world as an entity independent of knowing subjects, waiting to be acquired by them. But this does not mean that content is not *enacted* by knowing subjects, through their ongoing intelligent interactions with that world. (Legg 2021: 14766)

I think that the doctrine of *dicisigns* shows the opposite, that there is information in the world independent from the minds that interact with it<sup>6</sup>. As external representations, the rings of the tree would also form a *dicisign* for "this tree is x years old". For while it is true that the rings do not have the special properties that Hutto and Myin want, it is also true that the rings are not just covariant with respect to the tree in the same way as the parts of a dynamical system such as a thermostat covary with each other (van Gelder 1995). The tree's rings can actually convey information about the tree, information that an agent can pick up from the world. It is neither merely covariant, since it is informative, nor is it man-made in the sense relevant here.

While the theory of *dicisigns* shows that there is a genuine notion of external representation and information, I do not think that it can solve the hard problem of content for internal representations. Under Legg's interpretation, the theory would still be open to objections against internal representations. Compare habits as



internal representations with the notion of practical knowledge from Alva Noë's sensorimotor based theory of cognition criticized by Hutto and Myin (2013: 25-26):

This proposal runs into difficulties when attempts are made to coherently and non-vacuously articulate the precise nature of the knowledge in question – and especially how it can play the kind of mediating role it is assigned by this theory. In particular, it doesn't seem possible to tell a consistent story about how such knowledge is essentially practical yet nevertheless mediating.

Lastly, if we follow the externalist interpretation, *dicisigns* should not be examples of basic cognition. *Dicisigns* are signs that stand for something for someone. The firefly's sign stands for "here is a *Photinus*". Instead, basic cognition concerns, as in the case of the lady and the tram, cases in which an organism interacts not with a sign but with something that stands for itself<sup>7</sup>. In order to interact with the tram, one does not need the mediation of a *dicisign* that truly or falsely tells how things are<sup>8</sup>. What is necessary, however, is attention to be directed towards the tram. Marta Caravà has proposed that enactivist perception can well be described as the perception of external indices.

## **Indexes are not sufficient**

Caravà (2019) also aims at offering a semiotic interpretation of the enactivist conception of basic cognition. Her starting point is Ramsey's (2007) invitation to consider how non-mental representations function in order to better understand mental representations (see also Millikan 2021). After critically discussing some proposals in the literature on what criteria must be fulfilled for something to be a representation, Caravà then offers her four necessary criteria: a) standing-for; b) interpretability; c) genuine duration; d) decoupleability. I will not discuss these four criteria in detail. Granted the criteria, what interests me is why action-oriented representations (AOR), which are embodied, action-specific and context-dependent

mental representations (Wheeler 2005), are not mental representations and Caravà's alternative semiotic interpretation.

Caravà considers different versions of AOR's. Granted that AORs have a genuine duration (c), regarding (a-b) Caravà distinguishes between AORs as instantiated by neural correlates and AORs as instantiated by actions. In the first case, AORs are not representations because they do not fulfil the criteria. Even if Ramsey (2007) famously made precisely the point that the two conditions a-b should be taken separately and that we can conceive some part of the brain as the interpreter of some other parts of the brain as representations, I agree with Caravà that if we take the Peircean perspective it seems very difficult to ascribe the interpretative function to anything that is not at least a quasi-mind, as Peirce would have it, or an agent (see again note 1). In the externalist version, as Caravà calls it, the AOR fulfils criteria (a-b), because we can consider the body as the sign-vehicle (the AOR), the cue as the object of the sign and the responding action as its interpretant. I think this externalist version is just as problematic since it faces the same problem of not distinguishing between internal and external representations seen above. Similarly to Legg's interpretation of the dicsign structure, what Caravà calls external AORs are actually internal representations (the agent's reaction is seen as an interpretation of the AOR as an internal representation within the organism activated by a certain cue, and not as a response to the cue itself).

In any case, according to Caravà AORs do not meet criterion (d) of decoupleability. Even in the externalist version according to Caravà there is not true decoupleability because it is difficult to conceive how an action could be decoupleable from its object without becoming something else.

Let's see the semiotic alternative. Caravà proposes «to think of action-perception-based cognitive tasks as guided by indexical markers of salience distributed in the environment» (Caravà 2019: 168). She starts with semiotic niche theory, according to which organisms, through their actions, modify their environment

through the production of semiotic artefacts (either icons, indexes or symbols) that are able to guide, nudge, afford certain actions. Indexes, which are signs that stand for their objects by being physically connected to them, are deemed particularly relevant for the discussion about representations because they «seem to be endowed with the same properties that supporters of representation-based explanations of cognitive processes grounded in action and perception ascribe to AORs» (Caravà 2019: 169).

Think about a finger that points to the fire (CP 2.305). The finger functions as an index because it is dynamically connected to the fire. It is like a fire alarm that forces the agent's eyes to look at the source of danger. (Caravà, 2019, 168)

Being external signs physically connected to their objects, indexes are embodied; plus, they are context-sensitive and action-specific but «far less committed to a representational approach to cognitive processes» (Caravà 2019: 169). Caravà does not seem to regard indexes as representations, after all. But this is because she does not distinguish clearly between external and internal representations, and between indexes as a type of signs or as an aspect (part) of signs.

Caravà says that an index can guide behaviour. But it is doubtful that an index can do this by itself, at least according to Peirce's semiotics (but see also Millikan on pushmi-pullyu representation below). A possible source of confusion may be due to Peirce's shift from conceiving his theory as a classification of types of signs to aspects of signs. But even as a type of sign, an index is a sign that stands in place of something else with which it is physically connected. Peirce's example is the weathercock that stands for the direction of the wind. If we take Legg's tram example, it is not clear how it would help us to conceive of the tram as an index of something else. The woman interacts with the arriving tram, not with a sign of the tram, nor with the tram as a sign of something else. If, on the other hand, we consider the index as an aspect of signs, then indexes are not able to guide behaviour. Indices in

this sense are only indicators, not able to convey any information without the help of an icon. Hence, indexes are not sufficient to explain enactivist cognition.

## Diagrams

As we have seen, part of Legg's strategy was to say that habits can constitute the iconic part of a *dicisign*. She did not say that basic cognition is cognition of external signs. Moving from *dicisigns* to *diagrams*, I will follow the same strategy. On the other hand, Caravà proposed to replace AORs with external signs. However, we have seen how interaction with indices is not sufficient. A third option between the two is possible, namely that the organism's action and interaction with its environment can become part of an external *dicisign* meaningful *to someone else*. Following this intuition, we can explore the possibility that the organism's covariations and actions can become external representations of an iconic-diagrammatic type. In the rest of the paper I will explore this alternative.

Peirce divided signs in relation to their object in: icons, indexes and symbols. Peirce further divided icons into three types: images, diagrams and metaphors. As Stjernfelt has shown extensively (2000; 2007; 2023), while Peirce did not write a lot about images and metaphors, diagrams were instead a fundamental part of his epistemology (see also Legg 2013). Icons are signs that resemble some features of what they signify (CP 2.277). Icons are opposed to indexes and symbols, which are related to their object through direct contact and through a general habit, respectively. Hence, diagrams are icons and their particular mode of resemblance is through a skeleton-like sketch of relations (a prototypical example would be a map that represents the form of relation between the territory's elements).

For Peirce «all necessary reasoning without exception is diagrammatic [...] we construct an icon of our hypothetical state of things and proceed to observe it» (CP 5.162). Of great importance here is what Stjernfelt (2007: 90) called the *operational iconicity*

*criterion*. The icon is «the only sign by the contemplation of which *more* can be learnt than lies in the directions for its construction» (90). This prevents Peirce's notion of similarity from being circular (if anything can be similar to an object  $x$  in a certain respect, not anything can be an icon of  $x$ ). Even more importantly, this definition places at the centre the concept of interaction as elaboration on diagrams: «in order to discover these initially unknown pieces of information about the object hidden in the icon, some deductive experiment on the icon must be *performed*» (91, my italics). It is a form of doing that enacts more information, we could say.

Furthermore, icons in general, and diagrams in particular, are the only signs able to transmit evidence:

Now necessary reasoning makes its conclusion evident. What is this 'Evidence'? It consists in the fact that the truth of the conclusion is perceived, in all its generality, and in the generality of the how and the why of the truth is perceived [...] It is, therefore, a very extraordinary feature of Diagrams that they show, - as literally show as a Percept shows the Perceptual Judgment to be true, - that a consequence does follow. (Peirce NEM IV: 316-19)

Evidence in a diagram does not mean that reasoning based on diagrams is infallible (premises could be false, the construction of the diagram could be faulty). Far from being immediate and infallible, the elaboration on a diagram is doubly mediated. First, as we saw in the quotation from Peirce above, not all aspects of a diagram are iconic. Some aspects are symbolic (i.e. general), namely, the rules of its construction. Then, there is the actual elaboration on the diagram, which is again an act mediated by habits since «signs are only signs *in actu*» for Peirce (Stjernfelt 2007: 97).

This is a crucial point in order to understand the diagram's double determination - iconic and symbolic, perceptive and general - in Peirce. The diagram is an icon, but a special icon insofar as it is governed by a symbol, and in many cases doubly so, governed both by the type of rational relations used and the empirical phenomenon referred to.

So far I have been writing about the interaction with proper diagrams (logical diagrams, maps etc., see Chapman et al. 2018; Moktefi, Shin 2013)<sup>9</sup>. I would like to highlight three diagrams features relevant for the present argument:

- i) a diagram is a Sign, that is, a triadic *relation* that involves an object, a sign-vehicle and an interpretant; just like affordances, a diagram is co-constructed by the encounter of a subject with its environment (symbolic and iconic parts respectively);
- ii) a diagram is a Kantian schema, unlike the latter, however, it is an external sign and thus:
- iii) a diagram is publicly manipulable, allowing «collective and temporally distributed forms of thinking» (Tylén et al. 2014: 265).

Concerning point (i), we saw that a logical diagram includes its rules of use. Hence, a diagram is an external sign always made of at least two aspects: a) an iconic part, representing the form of relation of its object; and b) a general, symbolic part representing the rules of its construction. This leads us to point (ii), since this two-fold composition is derived by Peirce from his interpretation of Kant's fundamental question about schematism:

Kant declares that the question of his great work is 'How are synthetical judgments a priori possible?' By a priori he means universal; by synthetical, experiential [...] The true question for him should have been, 'How are universal propositions relating to experience to be justified?'. ('The Logic of Quantity', Chap. 17 of 'Grand Logic', 1893, 4.92, cited in Stjernfelt 2007: 94-5)

Stjernfelt further tells us that Peirce's diagrammatic schematism constitutes a pragmatization of Kant's epistemology. The synthetic a priori is pragmatized by substituting the universality of concepts with the generality of habits that mediate the elaboration on the diagram (in Legg's terminology, the schema is a diagram that connects a cue, which can also be an external *dicisign*, with an act as its interpretant). Second, Kant's subjectivism is pragmatized because,

as we saw, the operational criterion implies that everybody could reach the same conclusions if contemplating the same diagram, which leads to point (iii); (see Tylén et al. 2014; Stjernfelt 2012: 59).

My claim is that these features make the diagram the better semiotic concept for interpreting enactivist theory of cognition. The strong thesis that I am defending is that a form of *primary diagrammatism* is present all the way down to basic cognitions and basic interactions with the environment (cf. Queiroz, Atã 2014; El-Hani et al. 2009).

First of all, the diagram's double structure is suited to capture the dialectics between the structure of the environment (the iconic part) and the task-specific directedness that exhibits the agent's *ur-intentionality* (the symbolic part) from which affordances emerge. As Gibson would have it, affordances are neither subjective nor objective (Gibson 1979: 129). Second, the point about evidence transmitted by a diagram is coherent with the idea that affordances are perceived directly. Again, direct perception does not mean that it cannot be mistaken; direct perception just means that the perception of affordances is not mediated by internal representations (Gallagher 2020: 131; Chemero 2003). Notice how Legg's interpretation of *dicisigns* violates this point about the direct perception of affordances.

Finally, being an icon, the diagram can actually convey ecological information, unlike indices. This is a well-established point in the literature about representations. See for example Millikan's (1995) account of what she calls *pushmi-pullyu* representations, or Ramsey's (2007) notion of *S-representations*. A *pushmi-pullyu* representation is a kind of representation that is at the same time descriptive, i.e. it describes what is the case, and directive, i.e. it guides behavior and represents what ought to be the case. The example is a list of groceries which could be seen both as an inventory list and as a shopping list<sup>10</sup>. In turn, Ramsey's *S-representations*, taken to be the same as a *pushmi-pullyu* representation, are diagrammatic representations able to guide behavior thanks to their structure isomorphic to the object represented. Hence, a

diagram is able to guide behaviour without the interacting subject necessarily having to grasp the symbolic information contained in the diagram as true or false of some object, which is instead what dicisigns do (see figure 1). On this regard, it must be added that while diagrams are a subcategory of iconic signs on the one hand, they can also be considered as degeneration of Secondness in the Sign-Object relation, i.e. a degeneration of indexicality (just like metaphors can be seen as degenerate symbols) on the other. That is, diagrams, contrary to images, have also the ability to indicate an object through the structural similarity that they share with their objects.

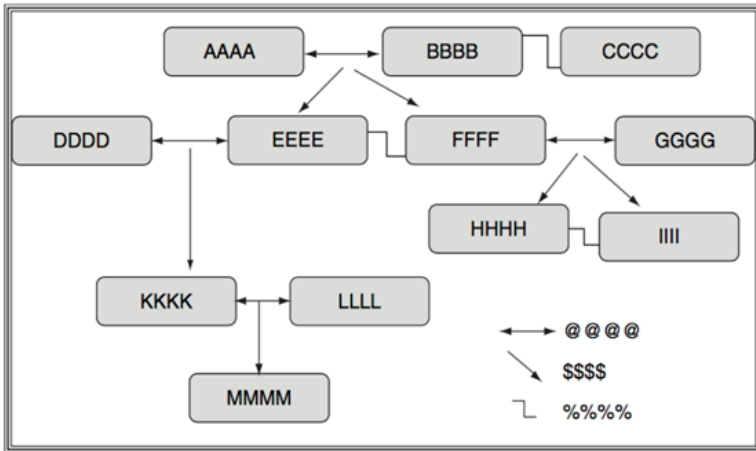


Figure 1. **Despite the symbols being meaningless, the representation is still able to guide behavior thanks to its structure**  
(from Ramsey 2007: 84).

I am not claiming that basic cognition is perception of external diagrams. The latter depends on how extensively one conceives the notion of sign, as I will say in the conclusions.



## Conclusions

The argument I have presented is that while *dicisigns* are not necessary, and indices are not sufficient, the diagrammatic structure is both necessary and sufficient to semiotically explain basic/teleosemiotic cognition.

To say that basic cognition is diagrammatic does not necessarily mean that it is the perception of diagrams. A point that has emerged throughout the discussion is that basic cognition is not necessarily cognition of signs. Although diagrams also convey evidence directly, and are directly manipulable, for enactivism basic cognition has to do with the direct perception of affordances offered by objects, not signs. Tim Ingold (2022) raised exactly this point.

It depends on how we define the sign. If a sign is the union of an acoustic image + a concept in the mind, as in the Saussurian tradition, then basic cognition cannot be cognition of signs. The same is true if a sign is an external vehicle that stands for something else. If, on the other hand, the notion of sign should also include enactive signs, as Malafouris (2013) calls them, which are signs that stand not for something else but for themselves and for the action they afford for an organism, then we could say that basic cognition is cognition of external diagrams as enactive signs<sup>11</sup>.

Sonesson (2016) faced a similar problem when he distinguished between iconicity as the phenomenological basis of semiotics and the icon as a sign. Similarly, here I proposed the notion of primary diagrammatism as an enactivist basis of semiotics. Primary diagrammatism thus does not mean that basic cognition is perception of external diagrams, but that it exhibits a diagrammatic structure. Organisms' action and interaction with the environment may give rise to diagrammatic signs, i.e. external representations of a portion of the environment for someone else. Moreover, diagrams may constitute the iconic part of an external *dicisign* for someone else (cf. Stjernfelt 2023). If we again take the tram example, the action of the woman boarding can become a diagrammatic sign that stands for the tram for an interpreter, similarly to Alfred

Gell's traps (1996). For Gell, a trap can be a sign both of the prey and of the trap designer because the actions afforded by the trap can diagrammatically represent both the form of the action the prey would perform in interaction with the trap and the actions necessary for the designer to construct the trap.

To conclude, the diagram gives rise to a genuine notion of external representation both in the extended Peircean sense seen with Legg and in the sense of Caravà's four criteria. The action of the woman boarding the tram has a genuine duration and it is a sign that stands for the tram for someone else, hence criteria (b-c) are satisfied in an externalist way; and it is decoupleable (d), in the sense that an interpreter could infer the tram from the sign. Contrary to Legg, Hutto and Myin, I think that the Peircean conception of representations offers a reconceptualization of the notion in support of external representations and external information. The primary form these representations can take is diagrammatic. The latter does not, however, commit us for or against internal representations. What I have tried to show here is that if one wants to semiotically interpret the enactivist theory of cognition, the best tool are not *dicisigns* nor *indices*, but *diagrams*.

## Endnotes

<sup>1</sup> See Gallagher (2017: 101) «one simple way to put this is that one of the triadic elements of the representational process is missing in the case of neuronal events or subpersonal processes more generally [...] A neuronal pattern or event might be considered a representational vehicle, but only in connection with an object (some event in the environment, perhaps) and a consumer or interpreter (to produce an interpretant or meaning). The missing element is the consumer».

<sup>2</sup> «If you look into a textbook of chemistry for a definition of lithium, you may be told that it is that element whose atomic weight is 7...But if the author has a more logical mind he will tell you that if you search among minerals that are vitreous, translucent, grey or white, very hard, brittle, and insoluble, for one which imparts a crimson tinge to an unluminous flame, this mineral being triturated with lime or witherite rats-bane, and then fused, can be partly dissolved in muriatic acid; and if this solution be evaporated, and the residue be

extracted with sulphuric acid, and duly purified, it can be converted by ordinary methods into a chloride, which being obtained in the solid state, fused, and electrolyzed with half a dozen powerful cells, will yield a globule of a pinkish silvery metal that will float on gasoline; and the material of that is a specimen of lithium» (Peirce 1902: CP 2.330).

<sup>3</sup> On the notion of self-controlled habits see Stjernfelt (2012).

<sup>4</sup> Cf. the notion of ententionality in Deacon (2012), and that of operative intentionality in Gallagher (2017).

<sup>5</sup> «The index aspect of the proposition concerns the fact that the flashes indicate the precise spacetime presence of these insects, because they are physically connected with these flashes: they are produced by the fireflies. The descriptive aspect of the proposition is provided by the specific signaling code used» (El-Hani et al. 2010: 49).

<sup>6</sup> Many enactivists argue against this form of ecological externalism, including Hutto and Myin (2013: 73) and Varela et al. (1991: 203); but many others agree, e.g. Chemero (2009), Carvalho and Rolla (2020) and Gallagher (2020).

<sup>7</sup> As these examples clearly show, the distinction between objects and signs is completely orthogonal to the opposition between nature/culture.

<sup>8</sup> A reviewer argued that he didn't see the difference between the externalist take on *dicisigns* and Legg's internalist take. First, he disagrees that a neat distinction between internal and external representations can be maintained from Peirce's strong scholastic realism. On this, I can only say that I hope the distinction appears clear to the reader, as I defined it. Enactivists themselves do not regard anti-representationalism as the rejection of the existence of paintings, novels, etc. (external signs). Their anti-representationalism is about internal representations as signs that mediate perception and cognition of reality for the subject of perception/cognition himself. Therefore, I defined internal representations as representations in which sign and interpreter are the same thing. Further, I consider Peirce's realism an argument for the existence of meaningful information external to our minds (i.e. for external representations). Secondly, the reviewer says there is no difference between the description of habits as the symbolic part that holds together an icon plus an index in a *dicisign* and «Legg's analysis that over time an agent learns to respond to a given cue (index) with a schema of behaviours (icon). Surely learning to respond to a particular index with a particular icon is precisely the establishment of a habit which 'holds the two together'». The difference is the following: in the externalist interpretation, the two parts of a *dicisign* are both external to the subject and co-localized by a habit of response (in Peirce's example of the portrait, the icon is the face of the portrayed person, the index is the legend, and the two are co-localised by the interpreter); in the internalist interpretation a habit co-localizes himself with

an index, or himself as an icon with an index, which is another way of saying that the representation is internal to the subject.

<sup>9</sup> Note that for Peirce symbols are not conventional signs: «a Peircean symbol is not a conventional sign [...] it is by no means arbitrary or conventional that the word “dog” applies to dogs. According to its definition, a symbol is a *general* sign, i.e., a sign whose object is general, because it applies to whatever realizes the character imputed to it» (Bellucci 2018: 69).

<sup>10</sup> Moreover, Millikan (1995: 191) herself connects her notion of directive representations, i.e. representations of possible ways of moving, with Gibson’s affordances.

<sup>11</sup> Although he was not referring to Malafouris’ theory, Ingold recently judged as “obscurantist” the possibility of considering objects and their affordances as signs during his keynote speech at the 2023 Nordic Association for Semiotic Studies XIV conference in Helsinki. If he meant that labeling both phenomena as semiotic risks blinding us to an important difference, then I agree. Following Ingold’s suggestion, I think it is better to retain the definition of sign as *aliquid* that stands *pro aliquo* absent to distinguish the two phenomena.

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