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Chapter 3

Between Saying and Doing: What Logic for Gestures?

Abstract: The present chapter aims to illustrate what kind of logic is implied and demanded by gestures in light of Peirce's thought and his understanding of logic as semiotics. By relying on recent studies, the first part—"Meaningful Gestures"—provides a minimal definition of the gesture from a pragmatist perspective. Given such a characterization, the second part—"Gestures in Logic"—focuses on the role and relevance of gestures in the proposition according to Peirce's logical analysis, which he developed after his research on the logic of relatives. Finally, the third part—"For a Logic of Gestures"—investigates what kind of logic gestures require and express. As Peirce emphasized, logic is semiotically characterized and should not be based on (Indo-European) linguistic bias. Similarly, gestures should not be conceived of as embodiments of abstract judgments but the other way around. Gestures come first and allow us to understand better the very structure of reasoning, which—in Peirce's perspective—is not founded on the classical equation relationship ($A = B$) but rather on the copula of inclusion or implication.

Keywords: Peirce, Charles S, semiotics, pragmatism, the logic of relatives, reasoning, synthetic judgments

1 Meaningful Gestures: Toward a Pragmatist, Minimal Definition of "Gesture"

The present article investigates from a pragmatist perspective (particularly from that of Charles Sanders Peirce) what kind of logic is required by gestures. But what are gestures? How can they be described and defined in their essential features? Before focusing on their logic, this introductory section addresses these

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preliminary questions on the nature of gestures, relying on both classical sources and recent studies in the pragmatist field.

As Wittgenstein recalls by quoting Augustine at the beginning of his *Philosophical Investigations*, gestures are “the natural language of all peoples, the language that by means of facial expression and the play of eyes, of the movements of the limbs and the tone of voice, indicates the affections of the soul when it desires, or clings to, or rejects, or recoils from, something” (Augustine, *Confessions* I, 8, quoted in Wittgenstein 2009, 5, emphasis added). This wide definition underlines that gestures can be comprehended as that “universal” language that makes equal all peoples. Gestures are thus characterized as bodily motions endowed with a certain meaning insofar as they always express “something”: an intention, a desire, a feeling, etc. To this extent, gestures are always meaningful. Every gesture carries a meaning, which can be either known or unknown to the listener; determinate, indeterminate, or even vague about the contents it aims to express. Accordingly, gestures can also be misunderstood or misinterpreted, but—even if the meaning of a gesture is unclear—one cannot avoid wondering: “What does it mean?”

For this reason, the preliminary, general definition of gesture adopted through the article is the one that Giovanni Maddalena provides in his *Philosophy of Gesture*: “Gestures are the ordinary way in which we carry on meaning, as the etymology of the word (from *gero* = I bear, I carry on) implies.” Better yet, “Gesture is any performed act with a beginning and an end that carries a meaning” (Maddalena 2015, 9, 69–70).

Two clarifications are in order to fully understand the significance of this definition, which at first glance may seem even trivial. First and foremost, stating that gestures are “the ordinary way in which we carry on meaning” does not imply that they must be construed as *vehicles*, or *incorporations* of meaning, as if meaning was pre-established, or preceded them. From a pragmatist perspective, meaning is never an ideal construction or a ready-made concept (such as a Platonic idea) that is *then* translated into the bodily shape of gestures. By following William James’ pragmatist suggestion to “looking away from first things, principles, ‘categories,’ supposed necessities” and to “looking towards last things, fruits, consequences, facts” (James 1907, 54–55), and Charles Sanders Peirce’s pragmatic maxim, which asserts that any meaning “lies in purposive action” (Peirce NEM 2, 520, c. 1904),¹ it is possible to conclude not only that gestures are *per se* meaning-

¹ The full quotation from the excerpt is: “Have you read Royce’s *World and Individual*? It contains the most persuasive presentation of the doctrine that the meaning, or ultimate translation, of a conceptual sign, that is, of a general sign, lies in purposive action. I put it into the form of a logical maxim in the *Popular Science Monthly* for January 1878; but I did not show there how I

ful, but also the other way around. *Meaning* is nothing apart from gestures and practices. Secondly, it is worthwhile noticing that such a conception of gesture diverges from other characterizations of gestures advanced in current, philosophical debates. This is, for instance, the case for Giorgio Agamben's notion of gesture (see Agamben 2000). According to his archeology, informed by Aristotle and Varro's *De Lingua latina*, gestures (from the Latin *gestum*, *gerere*) escape the classical distinction between *agere* (to act) and *facere* (to make), as well as that between *praxis* (whose end is the action itself) and *poiesis* (whose end is outside itself). Instead, gestures designate pure "mediality." In other words, from Agamben's perspective gestures are conceived of as pure *media*—means without any end—whereas, from a pragmatist perspective, gestures cannot be devoid of meaning, and are most of the time deliberate acts.

In addition to this definition, three relevant characteristics of gestures must be clarified in this introductory section. These features are not intended to provide a complete, exhaustive description of gestures, but must be comprehended as the "pins" that one sticks into the map of an unknown territory, as far as she proceeds.² The first essential and general feature of gestures is that it represents a very promising and fruitful conceptual tool, or conceptual device, because it permits to overcome some of the most notorious dualisms in the history of philosophy: that between body and mind, practice and theory, as well as dichotomies such as that between communication and knowledge, perception and intellectual understanding.

More specifically, as a second characteristic it is worthwhile noticing that every gesture *opens up a world of (new) meaning*. In the pragmatist definition already introduced, it has been emphasized how gestures are essentially *meaningful* gestures, since they carry on some meaning. This implies also that a gesture may break up with the previous chain of meanings, which constitutes the horizon within which it inscribes itself, and make possible paths before unexplored or even inconceivable. Noticeable examples of this kind of rupture with the past and this disclosure of new horizons of meaning is represented in the history of humankind

had myself derived it, namely from a logical and not a psychological study of the essential nature of signs" (Peirce NEM 2, 520–521, MS 137, c. 1904). The reference to the *Popular Science Monthly* is to the canonical formulation of the pragmatic maxim as expressed in "How to make our ideas clear," now in Peirce W3: "Consider what effects, which might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object" (Peirce W3, 266).

2 This image intentionally recalls Peirce's metaphor in his "Prolegomena to an Apology for Pragmatism," comparing the maps in his "diagrams of thought" with the maps during a military campaign (Peirce 1906, 492–493).

by the *gesture* of drawing³ and then of writing,⁴ which evolved the human animal in the shape that is familiar to us today. Or yet, if one focuses only on daily life, think about how a gesture of a colleague or of a person with whom you are barely familiar may spark a friendship. This feature of gesture has received interesting consideration in the thought of the Italian philosopher Carlo Sini, further evolved by Carmine Di Martino (2015) and Rossella Fabbrichesi (2019). According to his understanding of gestures, when a gesture happens, it always changes the “scene” of the world, opening up new possibilities and new horizons of meaning. As Fabbrichesi recently summarizes in her essay “From Gestures to Habits”:

Sini proposes that we define the gesture as “grapheme,” a writing of the body and world, a writing which traces the opening of experience by means of signs which are engraved in the body, the environment, the forms of pictorial and ideography writing. “In this sense, the gesture is the original writing of experience” (Sini 1996/2014, 20). I would also add that if each gesture is an original *gramma* (in Greek: writing, character, depiction), it is also a *pragma*, an action guided by a certain interest. (Fabbrichesi 2019, 351)

In the third place, gestures are not to be understood as ancillary to language—useful in some occasions to understand better the intentions of the speaker, or, even worse, considered as an optional frill, ultimately irrelevant to the reasoning carried out. On the contrary, according to a pragmatist approach, gestures properly constitute the origins of language. From a genetic-historical point of view, this perspective has been specially developed out of philosophy, by the so-called “Gestural Theory of Language evolution,” which is nowadays credited as one of the most important theories of language evolution.⁵ It largely claims that vocalizations and languages, which were spoken languages before becoming written languages, have stemmed from the communication through arms and hands that our ancestors performed at the beginning. In this regard, pragmatism (and, to some extent, phenomenology)⁶ offers a conceptual framework for this interdisciplinary research that connects ethno-anthropology, cognitive studies, animal

3 Consider for instance the idea of *homo pictor*, according to which the gesture of drawing has been what allowed human beings to become such. See Jonas (1962 and 1966).

4 See, among others, Sini (1996/2014 and 1996/2009).

5 For an overview on the gestural theory, see Gillespie-Lynch (2017), and for a discussion of the different hypotheses, see Kendon (2017). Among the most representative authors are Michael Corballis (2002) and David F. Armstrong and Sherman E. Wilcox (Armstrong and Wilcox 2007). The topic has been also explored from the 1960s by ethno-anthropologists such as André Leroi-Gourhan (Leroi-Gourhan 1964–1965).

6 Among classical phenomenologists, see especially Merleau-Ponty (cf. Gill 2010). For more contemporary efforts, inspired by a phenomenological approach see Vilém Flusser (2014).

studies, communication, and linguistic studies.⁷ On the whole, from a philosophical perspective, all those investigations are related to a continuistic perspective, which underlines the proximity, and continuity indeed, of human and non-human primates. For instance, Aristotle famously said that the human being is essentially characterized as “*zoon logon echon*,” later translated into Latin as “animal rationale” (rational animal), but originally meaning that humans are the only animals endowed with “*logos*,” the latter referring at once to *reason* and *language*, so that according to the Ancient Greek mentality “reasoning cannot be done without language” (Peirce W8, 24, 1890). Contrariwise, once language is acknowledged to stem from gestures, the peculiarity of human beings, if any, needs to be deeply reconsidered. If the gestural theory of language has been that emphasized, it is not for declaring the intention to jump into the vast and multifaceted debate about human and non-human beings. The point that is crucial for the issue at stake in the present article is that those kinds of research challenge the way we ordinarily think of reason (*logos*). In this regard, the first point to clarify is to what extent reason and reasoning can be construed without a linguistic framework. Accordingly, and to narrow the scope of the topic and state the point plainly, if language is *per se* a kind of gesture, and has its origins in gestures, how do we need to redefine reasoning, and the rules of reasoning (that is, logic)?

Last but not least, gestures from a pragmatist perspective are acknowledged as “social acts.” As for the gestural theory of language, this perspective is currently supported by a vast, interdisciplinary literature.⁸ Nonetheless, also in this case it is important to remember that the pragmatist philosophy of George H. Mead was pioneering in the field. As Fabbrihesi summarizes: “The gesture is the pragmatic unity par excellence: it produces a practical behavior and it triggers a social response” (Fabbrihesi 2019, 89). This appears clearly also from trivial examples of daily life, consider for instance the case of a mother smiling at her newborn baby, that stimulates the baby to smile back at her (see Stango 2024, *infra*). From a pragmatist perspective, a gesture—even when it is not conventional (as it may be conventional, for instance, the thumb up)—is always directed toward someone, always calls for, and provokes the other’s response. In the extreme case, the addressee can

⁷ This is also due to the importance and pioneering work of George H. Mead on gestures, at the crossroads of sociology, communication theory and philosophy (Mead 1934), usually highly considered for his view of gestures as *social acts* (see the following paragraph of the present section).

⁸ One of the most well-known voices in this field of research is the evolutionary psychologist Michael Tomasello. Among his vast number of works, see, for instance, Tomasello (2008).

be even the same gesture-maker.⁹ In this regard, it must be clarified that the response is to be understood in a very broad sense. By following Peirce's reflections,¹⁰ a response may be emotional, energetic (or volitional, as actions are), or logical, thereby implying that the meaning (of gestures) must not be interpreted in a narrow, rationalistic, or intellectualistic, sense.

All those features that come along with the minimal definition of the gesture from a pragmatist perspective are not merely remarkable, opening observations; they cannot be omitted for inquiring about the logic of gestures, because they all reveal how gestures call for a new re-thinking of reasoning, and therefore of logic, since the latter is conceived of by the author exactly as "the theory of reasoning" (e.g., Peirce EP2, 385). Therefore, to be able to move on to Peirce's contribution in thinking about the logic implied and demanded by gestures, it is first and foremost important to assess if and to what extent Peirce takes into account gestures in his logical inquiry. Accordingly, the question that addresses the second section is: do gestures play a role in Peirce's account of logic?

2 Gestures in Logic According to Peirce

Peirce did not elaborate on a specific theory of gestures, or discuss them in detail. Nonetheless, in Peirce's writings, special attention is paid to gestures in his logical essays, particularly in his logical analysis of the proposition, developed after his study of the logic of relatives (also called logic of relations). Before understanding the specific role of gestures in Peirce's logic of the proposition, two general assumptions, belonging to Peirce's overall perspective, need to be made explicit.¹¹

The first assumption is that, according to Peirce, logic is comprehended as semiotics: logic *is* semiotics, and vice-versa.¹² He states, for instance: "All thought being performed by means of signs, logic may be regarded as the science of the general laws of signs" (Peirce EP2, 260, 1903). Such a coincidence between logic and semiotics has two, complementary consequences. On the one hand, formal logic cannot be detached from its semiotic implications (see Tiercelin 1991, 191);

⁹ This is, for instance, well expressed by an Italian song from the seventies by Giorgio Gaber, entitled "Cerco un gesto naturale" ("I am looking for a natural gesture"), which states: "I am looking for a gesture to be sure this body is mine."

¹⁰ I am here referring to his notion of "interpretant"; for an introduction to the topic, see Liszka (1990).

¹¹ For those interested in Peirce's account of propositions, see Stjernfelt (2014) and Bellucci (2020).

¹² For a detailed study of his conception of logic as semiotics, see Bellucci (2014).

otherwise, Peirce's contribution to formal logic would be misunderstood or incomplete. On the other hand, without understanding the logical purport of Peirce's semiotics, the latter would lose its consistency and theoretical significance.

Second, it is essential to remember how, for the author, logic and language are interdependent. To express their relationship, he adopts the following, suggestive image: "What is logic? [. . .] it is quite indifferent whether it be regarded as having to do with thought or with language, the wrapping of thought, since thought, like an onion, is composed of nothing but wrappings" (Peirce EP2, 460, 1911). Nonetheless, his conception of language is broader than our common understanding of it.

There are undoubtedly numerous other ways of making assertions besides verbal expressions, such as algebra, arithmetical figures, emblems, gesture-language, manners, uniforms, monuments, to mention *only intentional modes* of declaration. Some of these are of the highest importance for reasoning. [. . .] So, cultivators of the art of reasoning found themselves long ago obliged to institute a speculative grammar¹³ which should study modes of signifying, in general. (Peirce EP2, 18–19)¹⁴

To see how these two considerations, which seem opposite at first sight, stand together, it must be clarified that for Peirce, logic cannot be devoid of language, but not in the sense of being reduced to or based on some specific "linguistic" patterns, such as some specific "usages of languages" (EP2, 221, 1903), or natural languages. Indeed, the author often addresses harsh criticism towards logicians and grammarians (whom he calls "children of Procrustes"), referring to both old logicians and his contemporaries, since they build logic upon pre-established modes of thought, or upon certain languages, especially on the Indo-European ones. Yet, as Peirce suggests, one cannot ignore that "our Indo-European languages bear as small a proportion to all the varieties of human speech as the phanerogams to the totality of forms of plants or the vertebrates to the totality of animals" (Peirce 2020, 23, 1894).

Given for granted these two general assumptions, gestures enter into Peirce's anatomy of the proposition¹⁵ under the function of "index, indices." By his own

13 For the sake of clarity, with "speculative grammar," Peirce means—by recalling Duns Scotus's philosophy—the first proper branch of logic that concerns "the general theory of the nature and meaning of signs" (Peirce EP2, 260, 1903).

14 Peirce adopts again, in this regard, the metaphor of the skins of the onion, though with a slightly different meaning: "One selfsame thought may be carried upon the vehicle of English, German, Greek, or Gaelic; in diagrams, or in equations, or in graphs: all these are but so many skins of the onion, its inessential accidents" (Peirce CP 4.6, MS 298, 1906).

15 Given the clarifications just made, it must be noticed that when Peirce speaks of the proposition he is not referring to its linguistic expression nor to the act of judging it. As he defines it: "is that sign of which the judgment is one replica and the lingual expression another" (EP2, 311, c. 1904).

definition, an index is a sign, or—to limit to the scope of the present article—a *gesture* which “awakens and directs attention,” “which denotes a thing by forcing it upon the attention” (Peirce 1896, 29). This is, indeed, more or less the unique way in which Peirce actually refers to “gestures,” in both published works and his big amount of unpublished manuscripts. As Peirce significantly says: “A tone or gesture is often the most definite part of what is said” (Peirce CP 5.568). So, this section explores only this “narrow” interpretation of gesture. To this extent, the function of indices, or (indexical) gestures, is that of determining what is the object of the proposition,¹⁶ causing the listener “to attend to realities” (Peirce 2020, 60), so that both the utterer and the interpreter can recognize what they are talking about. The most paradigmatic example of those kinds of indexical gestures is the pointing-finger. The author emphasizes,

“that chair is yellow” would be more accurately represented thus: “☞ is yellow,” a pointing index-finger taking the place of the subject. (CP 7.635, 1903)

As it is apparent, according to Peirce gestures enter into the analysis of the proposition as a substitute for the subject of the proposition. Actually, Peirce does not only say that they can stand for subjects, but also that they are more accurate than nouns, which usually account for “subjects” in propositions. In addition, he also comes to maintain that not only gestures, but even percepts, looks, or tones (cf. e.g., Peirce 2020, 60, 1896; EP2, 168, 1903; and R 787 CSP 22, c. 1896) can be considered as subjects of the proposition, inasmuch as they “are virtually almost directions how to proceed to gain acquaintance with what is referred to” (Peirce MS 596 CSP 36, c. 1902). But what does “subject” mean for Peirce, in light of this prominent role accorded to gestures in propositions? To offer a thorough-going response to this question, the latter can be reformulated as follows: what does the role of gestures (that is, indexical gestures) in propositions tell us about Peirce’s logic and syntax of propositions?

16 To be more accurate, Peirce states: “Indices may be distinguished from other signs, or representations, by three characteristic marks: first, that they have no significant resemblance to their objects; second, that they refer to individuals, single units, single collections of units, or single continua; third, that they direct the attention to their objects by blind compulsion” (Peirce CP 2.305, 1901).

3 For a Logic of Gestures

3.1 Peirce's New View of the Proposition

After his research on the logic of relatives,¹⁷ Peirce concludes that “the whole expression of the proposition consists of two parts, a pure Boolean expression referring to an individual and a Quantifying part saying what individual this is” (W3, 178, 1885). The same can also be explained in semiotic terms. From such a perspective, Peirce states that every proposition is composed by the conjunction of *an icon* (the Boolean part referring to an individual) and *an index* (the part that says what individual this is). As Peirce clarifies: “the former [the icon] is intended to create something like a picture in the mind of the interpreter, the latter to point to what [they/s/]he is to think of that picture as being a picture of” (R 284 CSP 43, 1905). Icon and index then correspond to Peirce's idea of “predicate” and “subject” (see, for instance, Peirce EP2, 277, 1903). To exemplify this point, by recalling the example mentioned in the previous section, consider the proposition:

“That chair is yellow”/“☞ is yellow.”

In these cases, the propositions can be logically analyzed as follows:

“That chair”/“☞”: *the quantifying part/index/subject*
 “_is yellow”: *Boolean part/icon/predicate*

This model is pretty divergent from the traditional, Aristotelian logical compound, according to which a proposition is analyzable as “S is P,” where *S* stands for the subject, *is* for the copula (understood as the verb “to be”), and *P* refers to the predicate. In more detail, in Peirce's case, the *subject*—as *index*—has the function of directing attention. It is not a substance of which one can predicate qualities. For Peirce, subjects must be conceived as neither substances, nor merely agents; they are the “indicative” constituents of propositions, which transform the predicate in a proposition by performing their function of “*stimulants to looking*, like the bicyclist's bell” (NEM 4, 173, R 441 CSP 12, 1898). As the author clarifies: “An index only says “There!” It takes hold of our eyes, as it were, and forcibly

¹⁷ From the 1870s to the late 1890s, Peirce wrote various articles on the logic of relatives, extending Boole's logic and comparing his results with De Morgan's logic of relations. Some of his works include philosophical considerations—especially the later ones—while the others are more technical, fully devoted to logical contents and of indisputable relevance for the history of logic (see Brady 2000). Also, it is remarkable that the only book published by Peirce (not entirely authored, but edited) is dedicated to these logical inquiries (Peirce 1883).

directs them to a particular object, and there it stops” (W5, 379, 1886). Similarly, when Peirce speaks of the predicate, he is not referring to a bare quality. First of all, for the author, the predicate includes the copula “is.”¹⁸ Better yet, as the author states, the predicate “contains a verb within itself” (Peirce EP2, 220, 1903), and the verb may vary. The predicate indeed designates “an icon, or image, without attachments to experience, without a ‘local habitation and name,’ but with indications of the need of such attachments” (Peirce 1897, 163).

According to Peirce, the proposition can be imagined as an atom, with the predicate/verb as “nucleus” and the places for the subjects as its unsaturated bonds (e.g., Peirce CP 3.421, 1892). For instance, in the previous example, the predicate is not only “yellow,” but “__is yellow,” where the blank space underlines the fact that in this proposition *one* subject is needed. If one then takes into account, as Peirce does (see CP 5.542, R 596, 1902), the proposition: “Anthony gives a ring to Cleopatra,” the predicate, in this case, is “__gives__to__,” and the three blanks indicate that three subjects are needed here: they are equally Anthony, the ring and Cleopatra. It is worth noting that here the icon is not only an “image,” but an image of *action*. This feature is indeed not accidental and coincides with the passage in Peirce’s philosophy between an idea of nominal relative (such as “__lover of__”) to a verbal one (such as “__loves__”), that is indeed precisely defined as “rhema” (from the Greek, meaning *predicate, verb*). As Peirce explains:

The word *donation* is indefinite as to who makes the gift, what he gives, and to whom he gives it. But it calls no attention, itself, to this indefiniteness. The word *gives* refers to the same sort of fact, but its meaning is such that that meaning is felt to be incomplete unless those items are, at least formally, specified; as they in: “Somebody gives something to some person (real or artificial).” (Peirce 1906, 511)

Accordingly, this new, original, logical understanding of the proposition paves the way not only to think of a logic of signs, but also a logic of gestures. Why?

18 As Peirce explains, the copula became the third essential component of the proposition only from the Middle Ages onwards, due to the language in use at the time (Latin). However, as also different natural languages testify to (see, for instance, old Egyptian), the copula is not necessarily the verb to be since that is a bias based on what Peirce calls the “Aryan syntax” (Peirce EP2, 20, 1895). See Brioschi (2020) for a more detailed account of Peirce’s new syntax of the proposition in light of Peirce’s logic of relatives, and see Brioschi (2022) for the implications at the categorical level. The logical function of the copula is connecting the icon and the index, indicating “that they are to be taken as signs of the same object” (Peirce EP2, 310). Accordingly, a copula may also be another word or the bare fact of co-localization or juxtaposition (see Stjernfelt 2019).

3.2 A Suitable Logic for Gestures

So far, it has been mainly investigated how Peirce's new analysis of the proposition takes into account gestures as its indexical components. From another perspective, it has been analyzed what is the place of gestures in Peirce's account of the proposition, and how such a view of propositions diverges from classic interpretations. But Peirce's contribution is not only confined to this. Indeed, once Peirce's notion of the proposition and its verbal kernel (both introduced in the previous section) are fully understood, it follows that (i) the predicate, too, can be construed as a gesture, and therefore (ii) that the logic of relatives, which lies at the basis of Peirce's new analysis of the proposition, can be assumed as an effective, logical model for the grammatic of gestures.

Accordingly, (i) the predicate can be seen as a gesture, though of a different kind of the pointing finger previously considered. The predicate is indeed an *iconic gesture*.¹⁹ Whereas Peirce's thought (and especially his idea of "icon") has been successfully adopted in visual and cognitive semiotics, it has scarcely underlined how Peirce's very idea of the icon (predicate, or *rhema*) also paves the way for conceiving a logic of gesture.²⁰ An iconic gesture does not define the subject of a proposition; rather, it stands for its central knot, which is *per se* indefinite and incomplete but encompasses the indications of what is needed to assume a determinate meaning, that is, to complete the proposition. For instance, let us consider when a professor, during a written exam in class, at a certain moment hears a whispering and reacts by placing the index finger vertically in front of the lips. This gesture, meaning "be quiet!," is indefinite and incomplete ("Who should be quiet?"), and for this reason, it often triggers another gesture. In the case considered, some students may point their thumbs at themselves, as if they said: "Are we the ones to whom you are saying to shut up?!" As it is in the case analyzed, the proposition can be understood as the conjunction of *two* kinds of gestures: an indefinite, descriptive, and "signifying" one and a defining (determining), "denotative" one.

Thus, by examining gestures, we can see how they assume a definite meaning, as propositions do, by stemming from the union of an *indexical* gesture with an *iconic* one. As it has already been explained, on the one hand, indexical gestures

¹⁹ For a detailed overview of iconic gestures, see Holler and Beattie (2003).

²⁰ Among the few that explore the broad meaning of Peirce's predicate, see Stjernfelt. For instance, he states: "Outside of linguistics, pictures, images, diagrams, gestures, etc. may form rhemes and thus appear as the predicative, propositional-function part of Dicisigns [that is, of propositions]. Common to all predicate rhemes is that they involve an iconic, descriptive sign" (Stjernfelt 2015, 1026).

help identify the object to which the predicate refers. This is the defining, determining gesture of the proposition, which denotes its subject. On the other hand, the iconic gesture stands for the predicate of the proposition. Differently from indices, the function of this kind of gesture is to describe, to resemble “something” (the latter to be understood not merely as a *thing*; it is especially a behavior or an action). Also, this kind of gesture is intrinsically incomplete: iconic gestures cannot be true or false, for instance. They are, *per se*, vague or indefinite because they are descriptive of “pure potentialities,” rather than of facts, which happen in some place at some moment. For instance, if one watches a performer, such as a mime actor, climbing (a ladder) or eating (an apple), there is no reference to who the climber is, to what the ladder (or the apple) is, etc. For this reason, Peirce states, “An icon can only be a fragment of a completer sign” (EP2, 306, c. 1904). Only once that gesture is conjoined with an indexical gesture, a proposition is obtained, though not in a linguistic fashion. It may happen that iconic gestures are verbally translated into the compound of the verb “to be” and a predicate/adjective. For instance, think about when one imitates with both hands the drops falling from the eyes; in this case, the meaning can be expressed as “_ is sad.” However, Peirce’s idea of the predicate is not limited to this specific form; it includes also complex predicates, as well as actions, together with the indications of the number of subjects/objects needed to make sense of that pure icon. This model is particularly evident when one examines gestures. For instance, the gesture of a “hug” requires a giver and a receiver, and their indications can be performed by gestures as well.

Furthermore, the logic of relatives should be assumed as a suitable logic for gestures because it challenges the common understanding of reasoning. It is well known how Peirce’s logical investigations allow to make room for creativity and synthetic reasoning in logic.²¹ Recently, starting from his philosophy, it has been also emphasized how synthetic reasoning and gestures are deeply connected.²² Nonetheless, it has not been underlined yet how this union is rooted in Peirce’s writings in mathematical logic. Since the profound connections between gestures and the logic of relatives have been explored in the last section, before moving to conclusions it is essential to touch upon the relationship between synthetic reason-

21 In this regard, the topics investigated the most are undoubtedly those related to “abduction”; see Magnani 2023.

22 Overall, in this chapter, “Synthetic reasoning” generally refers to ampliative reasoning. Recently, synthetic reasoning and gestures have been strongly related to one another. For a detailed analysis of why gestures and synthetic reasoning are deeply connected, see Maddalena (2015). The present research assumes this perspective as its starting point. Still, in comparison to that theory, the chapter diverges in the definition of synthetic reasoning as the “recognition of identity through changes.”

ing and the logic of relatives. In fact, it is thanks to the latter that Peirce aimed to reverse the classical connection between analytic and synthetic reasoning. More in detail, one of the crucial changes that Peirce's propositional logic introduced, if compared to Boole's algebra, is the adoption of the copula of inclusion (or implication, graphically represented as $\rightarrow$ and later $\searrow$) instead of that of equation ($=$), so that his new definition of identity is: " $(x = y) = (x \rightarrow y \ \& \ y \rightarrow x)$ " (Peirce W2, 360, 1870). At first glance, this might seem a slight difference. However, by adopting the copula of inclusion, which exhibits a transitive and antisymmetric relation, Peirce maintains that this copula is more primitive than the equation and, therefore, must be acknowledged as *the* basic structure of reasoning.²³ As a consequence, synthetic reasoning too can be viewed as the most original way of thinking. From this perspective, it lies at the very heart of every kind of reasoning, including the analytic one, which is, instead, typically based on the equational model, and usually considered as the primary, logical form upon which the other kinds of reasoning are built.

4 Concluding Remarks

As the first section has shown, gestures are crucial from a pragmatist perspective, because they allow us to understand meaning in its making, as arising from experience and interwoven with the threads of practices. Due to this relevance, the second section illustrates how Peirce's philosophy of logic, understood as semiotics, encompasses gestures. After describing the role and place that gestures assume in Peirce's analysis of the proposition, the third section revealed that gestures represent an eloquent example of how Peirce's account of the proposition is valid also for the non-verbal types of communicative language. Furthermore, by thinking *with* Peirce and on the basis of his own system, it has been argued that the logic of relatives constitutes an adequate model for deciphering the grammar of gestures, and can be assumed as the starting point of a thorough understanding of reasoning as synthetic.

²³ The author also emphasizes that this implicational model is the one which corresponds to inference (see Peirce, NEM 4, 174, 1898).

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