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# Iconicity in different types of gestures

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The paper presents a framework for classifying gestures in terms of different parameters, and shows that the parameter of iconicity cuts across that of cognitive construction, which distinguishes codified gestures — those represented in memory as stable signal–meaning pairs — from creative ones — those invented on the spot on the basis of a few generative rules. While creative gestures are necessarily iconic, because they can be understood only thanks to their iconicity, codified gestures can be iconic too. A model for the generation of iconic gestures is presented, according to which, to create a new gesture, people select the features of the meaning to imitate in terms of their distinctiveness, ease of representation and ontological type. Finally, some principles for measuring the iconicity of gestures of Hearers and Signs of the Deaf are illustrated, thus outlining the continuity of iconic devices between creative and codified gestures.

**Keywords:** gestures, iconicity, generation of iconic gestures

## Gestures and iconicity

In this work I put forward some considerations regarding the iconicity of gestures, starting from the framework for the study of gesture and multimodal communication I have elaborated since the nineteen eighties at the University of Rome (first at University “La Sapienza”, later at “Roma Tre”). I define gesture according to a notion of communication in terms of goals and beliefs, then I present a framework for classifying gestures, and finally I deal with the issue of iconicity in different types of gestures.

## A goal and belief model of communication

According to a model of communication in terms of goals and beliefs (Castelfranchi & Parisi, 1980; Poggi & Magno Caldognetto, 1997; Poggi, 2007), we can

say a communicative process takes place when at least the following conditions are fulfilled:

- a System S (Sender) has the goal for a System A (Addressee) to come to have some belief B
- in order to reach this goal, S produces a signal *s* which S believes is linked, in the minds of both S and A, to belief B (as its Meaning M)
- the signal *s* is any physical stimulus that is produced by S by means of his/her body or of some artificial tool (the signal Productive Modality PM), and can be perceived by A through some sensory system (Receptive Modality RM)
- the signal *s* is linked to its Meaning M through a Communication System CS, that is, a system of rules to link signals to meanings

In this definition, the goal of communicating is a necessary condition for communication to hold; but this may come from different sources and be represented at different levels of awareness. It may be not only an individual's internal goal (e.g., I have the goal to write a paper because I want readers to know about my research), but also stem from biological needs (a seagull flies high to warn the flock of a predator), or social functions (a policeman's social role is signalled by his uniform). Moreover, the goal of communicating can be represented at different levels of awareness. It may be conscious, i.e., represented but also meta-represented in the individual's mind: in almost all verbal communication I both want to communicate something and know I want to. But also unconscious: I am angry at a friend, consciously I do not want to show my anger, but while talking I do not gaze at him, or pull a long face. Finally, the goal of communicating may be tacit, i.e., not under aware attention, out of a cognitive economy, to prevent attention overload: for instance, in raising the eyebrows or moving hands up and down to stress syllables.

### **Defining gesture**

I define as gesture any movement performed by hands, arms or shoulder. People use gestures to do things, to touch objects, other people or themselves, and finally to communicate. So, how can we define a gesture as communicative or not? According to the model presented, I define as a communicative gesture any movement of hands, arms or shoulders used by a Sender for the goal of communicating some meaning to some Addressee. A communicative gesture is thus a signal–meaning pair: the signal is a particular movement of the upper limbs producing a particular shape and a particular position of hands, arms and shoulders; the meaning is a belief mentally represented either as a mental image or in a propositional format.

Signal and meaning are linked to each other in the mind of the Sender, who believes they are also in the mind of the Addressee.

How to assess whether a gesture is either a communicative or an instrumental gesture, that is, whether it is ruled by a goal of communicating or simply by the goal of doing an instrumental action, is an empirical issue, to assess case by case, based on its context. Actually, it is possible that some physical cues in the motion pattern of how one moves hands can tell us whether that gesture is communicative or not (Kendon, 2004, Chapter 2; Kendon, 2005). Moreover, in recent years brain imaging techniques seem to have made it possible to assess when a gesture is communicative or not on neuro-physiological grounds (Bertenthal, 2005). Yet, since the goal of conveying beliefs can be unconscious or tacit, it is not always empirically easy to state whether a gesture is communicative or not: if in an embarrassing situation I touch my hair, how can you tell whether I am simply arranging my hair or unconsciously expressing my embarrassment? In any case, be it easy or difficult, possible or impossible to state, to tell whether a gesture is a communicative or non-communicative one is in principle an important distinction to make.

### Parameters to classify gestures

All previous research has acknowledged that different kinds of gesture exist, and several typologies have been proposed, using different criteria. In my view, all gestures can be classified in terms of the following parameters:

1. Semantic content: Information on the world, on the Sender's mind, on the Sender's identity

Some gestures convey information on the World: *rubbing thumb and index finger* in many cultures (from Italy to South Africa) means "money"; *shaking hands near the shoulders* like wings can mean either "bird" or "fly". These gestures convey beliefs concerning the external world: abstract and concrete objects, persons, animals, events. Others inform about the Sender's Mind: beliefs, goals and emotions concerning what s/he is talking about. The *palm up open hand* (Müller, 2004; Kendon, 2004, pp. 264–281) means that what we are saying is obvious, self-evident, thus informing about the level of certainty we attribute the beliefs conveyed; *snapping thumb and middle finger* = "I am trying to remember" informs about their source (our long-term memory). These gestures inform about our beliefs, others about our goals: *raising flat hand with the index finger near shoulder* conveys a performative of request of attention; Kendon's (1995) *finger bunch–open hand sequence*, distinguishing topic and comment of a sentence, informs about our discourse plan

(see also Kendon, 2004, pp. 233–236). By *pulling our hair* we tell about an emotion, despair. Finally, some gestures provide information on the Sender's Identity: his identification with a social, political or ideological group (see the nazi salute), or the image he wants to project (*open hand on heart* to give the impression of a noble and fair person).

## 2. Goal source: individual, biological, or social

As all communicative signals, gestures can have individual, biological, or social communicative goals. If I *point to the left* in giving directions, I have a communicative internal individual goal; gestures expressing emotions, like *opening arms* in surprise or *covering face* in shame are ruled by biological goals; *putting hand on mouth* while coughing is a polite gesture stemming from social goals, on behalf of the commonality.

## 3. Level of awareness: conscious, unconscious, or tacit

Some gestures shared in a culture, like *rubbing thumb and index* to mean “money”, or *index and middle finger extended open upward*, a sign of victory or exultance, are governed by conscious goals, goals that we have and we know we have; the “beats” scanning the rhythm of our speech have a tacit goal of communicating. But if we consciously try to inhibit our aggressive goals and aggressive gestures leak inadvertently, they are governed by unconscious goals of communicating.

## 4. Relationship to other signals: autonomous vs. co-verbal

Gestures differ for their relationship with simultaneous speech, thus being either **autonomous** or **co-verbal**. Co-verbal gestures are necessarily produced during speech, while autonomous ones sometimes co-occur with speech but sometimes completely replace words. So the only gestures necessarily co-verbal are the beats that scan the rhythm of speech to segment the sentence and mark topic and comment: given their syntactic and textual function, by definition they cannot be used in absence of speech. All other types of gestures are autonomous, at least in principle (Poggi, 2007).

## 5. Cognitive construction: codified vs. creative

A relevant parameter to distinguish gestures is their **cognitive construction**: whether and how they are represented in the Sender's mind. Some gestures are **codified**, i.e., steadily represented in the mind as lexical items of a gestural lexicon;

rules of correspondence stored in our long-term memory that link a particular gesture to a particular meaning: stable gesture–meaning pairs. A typical case of codified gestures are “symbolic” gestures, those that in some cultures have a canonical form and a shared meaning, and can be glossed and quoted by a shared verbal formulation (Poggi, 2002). In my view, though, also the gestures studied by Müller (2004) or the so-called ‘pragmatic’ gestures discussed by Kendon (2004, pp. 225–283), in spite of their not being “quotable” (Kendon, 1990, 1992; Brookes, 2004), are codified: their meaning is shared and steadily represented in the Senders’ memory.

However, sometimes we need our hands to convey some meaning or to evoke some referent, but no ready-made gestural signal corresponds to that meaning in our mind, so we have to “create” a new gesture, a “creative” gesture: a gesture invented on the spot based on a set of generative rules such as the one that states, for example, that to refer to an object you can point at it, or imitate its shape or movements, or the actions performed onto it.

Creative gestures may be either deictic or iconic. A **deictic** gesture points at some place requesting the Addressee’s attention to refer to the place itself or to an object, person, concrete or abstract event located in or linked to that place. A **creative iconic** gesture is a creative gesture that reproduces some perceivable aspects held by or linked to the meaning it conveys.

Both deictic and iconic gestures mention some concrete or abstract entity or event, and do so by selecting a particular feature of it. If the referent is in the surrounding context, its most salient feature is its present location, so one simply indicates in what direction the Addressee can find that referent (deictic gesture). But if the referent is not there, and it cannot be easily connected to something you can point at — as it is in abstract deixis — one has to create an **iconic** signal for it, which imitates the referent by selecting one or more of its visually perceivable features and representing them with hands.

## 6. Gesture–meaning relationship: motivated (natural or iconic) vs. arbitrary

An important parameter to distinguish gestures is the relationship between the signal side of the gesture — its handshape, location, orientation, and movement — and its meaning. A gesture, like any communicative signal, can be either **motivated** or **arbitrary**. **Motivated** when its meaning can be inferred from the signal even by someone who has never seen it before; therefore, when the meaning is linked to the signal in some non-random way. A gesture is **arbitrary** when there is no motivated relationship between its signal and its meaning.

A motivated gesture can be either **iconic** or **natural**. An **iconic** gesture is one linked to its meaning by a relation of **similarity**, in that some perceivable parts

or aspects of the signal resemble (imitate, mime, are similar to) some perceivable parts or aspects linked to the meaning. *Drawing the outline of a cello* to mean “cello”, or *swaying a hand as a snake* to mean “snake”, are iconic gestures. A **natural** gesture is one linked to its meaning by **mechanical determinism**: *shaking raised fists* to express joy or triumph is not iconic, since it does not “imitate” joy, but is determined by the physiological activation produced by the emotion of joy, that necessarily causes outward or upward movements (Anolli et al., 2002). A gesture is natural when its perceptual and/or motor aspects are the same as those produced by a biological event linked to the meaning of the signal itself.

A gesture is **arbitrary** when between the signal and its meaning there is no relationship — similarity, mechanical determinism, or any other kind of link — that allows one to understand the meaning from the signal without knowing it in advance.

### **Gestures and iconicity within a goal and belief view of multimodal communication**

Starting from these general criteria for the classification of gestures, I now focus on the issue of iconicity.

First, it should be clear that iconic gestures are not only those that McNeill (1992) called “iconics”, like the one of showing how Sylvester drops a ball into a drainpipe, or the one depicting the outline of a building in giving directions (Kopp et al., 2004). Iconicity is also found in “symbolic” gestures: *moving index and middle finger extended open upward toward the mouth* to mean “smoke” is strongly iconic, since it closely resembles the movement one makes in smoking a cigarette. Within a system of symbolic gestures, like those used by hearing Italians, a high percentage of gestures are in fact iconic (Poggi, 2007). And also the “palm up open hand” (Müller, 2004; Kendon, 2004, pp. 264–275) meaning “this is clear, self-evident” seems to present something open and clear to everyone: this is an iconic gesture too, in that it resembles some part or aspect of the meaning it conveys.

These different examples can be better classified by crossing parameter 5 (cognitive construction) with 6 (signal–meaning relationship): so McNeill’s (1992) and Kopp et al.’s (2005) “iconics” are in my sense “creative iconic gestures”, since they are created on the spot and not retrieved by long-term memory; while the gesture for “smoke” and the “palm up open hand” are iconic but “codified”.

Actually, there is a link between these two parameters. An arbitrary gesture must necessarily be codified, while a creative one must necessarily be motivated to be understood. On the other hand, both arbitrary and iconic gestures can be

codified. Among the codified gestures of the hearing Italians, beside iconic gestures there are also some arbitrary gestures (like *open and close hand* to say “hello”).

A codified gesture can afford being both arbitrary and motivated, because it owes its intelligibility to its being shared and memorised by Sender and Addressee. On the contrary, a creative gesture, being completely new, can only be iconic: if it were not motivated, the Addressee would have no way to understand what it means. So both the Addressee and the Sender, in understanding and producing a creative gesture, must rely on a small set of generative rules that allow them to infer the meaning from the signal and vice versa.

Suppose S wants to communicate some meaning M to A, but they cannot hear each other because they are separated by a pane of glass. The only way for S to communicate meaning M is through a visual modality, so S checks whether a codified gesture whose meaning is M is represented in her mind. If she finds a ready-made gesture, she will produce it: if the meaning to communicate is “money” she might rub thumb and index finger. But if no manual signal is already linked to the meaning to communicate, S will have to create a new gesture, a creative gesture: if the meaning to convey is “duck”, for which no codified gesture exists in her gestural lexicon, she could mime a duck walking with its webbed feet, or pretend to elongate her mouth into a flat beak, thus creating a new gesture.

In both cases the meaning S wants to convey is given, but what is the difference between making a codified gesture and inventing a new one? For a codified gesture, what is stated in memory is not only the signal–meaning link that makes a certain combination of beliefs correspond to a certain motor pattern — shape and movements of the hands; the motor pattern is strictly codified too. Not only in sign languages but also in the lexicons of symbolic gestures of Hearers, the way a gesture is made is highly codified. In a symbolic gesture it is sufficient to change one value in one of its parameters — a slightly different handshape, a location a bit further from the face, a more curved movement — and it is not the same gesture: it changes meaning or it has no meaning any more. So when a codified gesture exists for the meaning you want to convey, you simply have to search your gestural lexicon for a lexical entry whose meaning best overlaps what you want to communicate, and to produce the motor pattern linked to that meaning as its corresponding signal. But if you do not find such a “lexical entry” you must create a gesture from scratch.

To create a new gesture, you have to “make decisions” concerning both the meaning and the signal side of the gesture. What you do to make an iconic gesture on the signal side — whether to depict, or to mime, and how — is analysed by Streeck (forthcoming). Here I focus on what happens on the meaning side of a creative iconic gesture, starting from the cognitive process required to refer to something gesturally (Poggi, 2007).



## Naming through gestures

The job of identifying a referent is accomplished through singling out a set of properties or features that can lead one to identify it univocally. One feature of a referent is the place in which it presently is, or to which it is in some way linked, and this is the feature referred to in deictic gestures. But if the referent is not present, and the place pointed at is only indirectly linked to it, pointing might not work. Another device will do: naming the referent by creating a noun for it. Creating an iconic gestural noun implies sorting out and miming — that is, imitating with our hands — one or a few aspects of the referent that allow the Addressee to restrict his guess about what we are referring to. The features of a referent, and of any meaning to be conveyed, that are mimically represented in creating a new gesture, are chosen on the basis of both our goals and our communicative resources: we represent those beliefs that are, at the same time, most distinctive of the referent, and possible and easy to be represented by hands.

Previous studies (Zomparelli & Poggi, 1987; Magno Caldognetto & Poggi, 1995; Poggi, 2007) have proposed a model for the generation of creative iconic gestures. The features we select to represent a referent manually are the following:

1. the REFERENT'S SHAPE: to mean "mountain" you can outline a conic shape, for "brioche" your hand forms a rounded shape
2. the REFERENT'S LOCATION: to mean "sign", you draw a rectangular shape up over you head; for "mountain" you can point far away
3. the REFERENT'S TYPICAL ACTIONS: to mean "bird" you move hands like wings; for "lightning" you depict its zigzag trajectory
4. an AGENT'S ACTION with the referent: to convey "mountain" you pretend climbing or skiing

These features, though, are not sufficient when the meaning to convey concerns an abstract, non-perceivable referent like "democracy" or "science"; or something perceivable but not through vision, like "wind"; or visually perceivable but not representable by hands, like "green". In such cases subjects resort to a "Medium Referent" (MR): one that can be represented by hand movements, but is also linked, through some rule of inference, to the referent to be mimed ("Target Referent", TR), thus bridging the gap between concrete representation and abstract meaning.

To illustrate the inference rules we have found to be in use, we describe the way in which subjects in Zomparelli and Poggi (1987) created gestures when asked to do so for the meanings listed below. The Medium and Target Referents can be linked to each other by the following inference rules:

1. A CAUSE–EFFECT relationship, where MR, with respect to TR, can be
  - a. a CAUSE of TR: to mean “surprise” subjects represented offering a gift — a possible cause of surprise;
  - b. an EFFECT of TR: to mean “wind, subjects mimed waving hair or leaves; to mean “noise”, they displayed an annoyed face;
  - c. an AGENT who is a source of TR: for “science”, subjects mimed the actions or the look of a scientist;
  - d. a LOCATION seen as a source of the TR: for “idea”, subjects pointed their index finger to their head.
2. An OBJECT–FUNCTION relationship: to represent “noun”, a subject depicted a label on her breast.
3. A CLASS–PROTOTYPE relationship: to mean “dictatorship”, a subject mimed Mussolini.
4. A relationship of OPPOSITION and its NEGATION: to mean “democracy”, a subject mimed the typical posture of Mussolini, seen as a prototype of “dictatorship”, the opposite of “democracy”, and then denied this. To mean “freedom”, a subject pretended to be behind the bars of a prison (the opposite of “freedom”) and then to come out of it.

This model of the generation of creative iconic gestures does not yet allow us to certainly and completely predict which features of a referent will be selected to be mimed, but it is a first step toward such prediction. It implies, for instance, that a creative iconic gestural noun will be more difficult to be produced and understood when a Medium Referent is to be found, but also that any time we have to create a new iconic gesture we use one of these strategies, or a combination of them, in such a way that for no meaning it is in principle impossible to be represented gesturally (Galantucci, 2005).

Another step toward predicting what gesture will be invented to convey a given meaning implies taking into account not only the perceivable features of a referent, meaning, or concept, but also its ontological type, that is, the type of semantic entity it constitutes (Caramelli et al., 2004). A first analysis in this direction addressed the iconic gestures produced by Primary school teachers in an experimental study (Merola, 2007). Four teachers were videotaped while uttering a list of words and making iconic gestures to let their pupils understand and memorise them better. The words were 24 concrete common nouns mentioning actions (like *play, run, shot, step, jump*), artefacts (*coach, cash, deck, throne, boat, train, ball, cake, ladder, book, sack, bomb*), natural objects (*valley, mountain, point, beak*), and animates (*cat, fish*). Each teacher uttered all nouns by accompanying them with iconic gestures to illustrate them. The iconic gestures were analysed as in Table 1. Col. 1 classifies the noun as to its ontological type; col. 2 contains the noun to be

**Table 1.** Analysing iconic gestures

1 Type of noun	2 Noun	3 Gesture	4 Meaning	5 Selected features
Action	<i>run</i>	<i>Bent arms parallel to hips move back and forth</i>	Move arms	Agent Action
Artefact	<i>wheel</i>	<i>Right index extended depicts a circular shape</i>	Circular	Referent Shape
	<i>ladder</i>	<i>Arms with closed fists palms forward move upward alternatively</i>	Climb	Agent Action
Natural object	<i>mountain</i>	<i>Hands with fingertips touching and palms oblique go down and separate</i>	Conic	Referent Shape
Animate	<i>fish</i>	<i>Curve thumbs and indexes first touch then separate depicting an oblong shape</i>	Oblong	Referent Shape
	<i>cat</i>	<i>Index fingers extended close to temples move up and down</i>	Move ears up and down	Referent Action

**Table 2.** Selected aspects and ontological types

	Shape		Location		Referent Action		Agent Action		TOT
	n.	%	n.	%	n.	%	n.	%	n.
Action							18	100	18
Artefact	11	23	1	2	9	19	27	56	48
Natural object	10	83	2	17					12
Animate	2	18			8	73	1	9	11
TOT	23		3		17		46		89

illustrated, 3 the accompanying gesture, 4 the meaning of the gesture produced, and 5 the semantic aspects of the noun selected by the gesture meaning.

In some cases, different teachers made very similar gestures for the same noun, while sometimes a teacher made two gestures, selecting different features, to convey the meaning of a single noun. By computing the semantic aspects selected by the gestures produced to accompany the given nouns it was possible to assess what semantic aspects of a referent are most likely to be selected depending on the ontological type of the meaning to convey (Table 2).

As shown in Table 2, to represent an action, the teachers' gesture selected the Agent's Action in 100% cases. For artefacts, Agent Action was selected 27 times out of 48 (56%), shape 11 times (23%) and Referent Action 9 times (19%). For natural objects, 10 gestures (83%) represented Shape and 2 (17%) Location, while 2 more were not in fact iconic gestures but exploited pointing. For animate objects,

8 (73%) represented Referent Action, while only 1 (9%) Agent Action, and 2 (18%) Shape.

These results confirm that the ontological type of the meaning to be conveyed also affects the choice of the features to be represented by hands.

In conclusion, every time one has to create an iconic gesture to convey a concrete referent one represents some distinctive aspects of it: the Referent's Location, Shape and Actions, and the Actions performed on/through/about it. The aspects selected to be represented manually highly depend on their degree of distinctiveness, on their ease of depiction, and on the ontological type of the target meaning — whether action or entity, animate or inanimate, natural object or artefact.

The very existence of a shared generative device based on iconicity allows for the production and comprehension of newly created gestures. This is why a gesture created from scratch is necessarily iconic: to allow reciprocal understanding between Sender and Addressee.

### Iconicity in codified gestures

That a creative gesture is necessarily iconic does not imply that a codified one cannot be iconic: it may or may not be so. And in fact, many codified gestures are iconic: not only many signs in Sign Languages of the Deaf, but also many symbolic gestures of the hearing (Payrató, 1993; Poggi, 2002; Brookes, 2004), and finally many of the gestures that are codified without even being of the symbolic type: those studied by Calbris (1990, 2003), Müller (2004), and Kendon (2004, Chs. 11–13). And even, we can reasonably think that most symbolic gestures were first born as iconic gestures — just as for words, as hypothesised in Plato's *Cratylus* (Plato, 1963), that they all stemmed from an onomatopoeic origin.

Only when a newly-created iconic gesture is used more and more, can it become a codified gesture, and can then lose its iconicity, becoming schematic and stylised, as shown by historical change in Sign Languages (Klima & Bellugi, 1979; Radutzky, 1981, 1987). It can afford to lose iconicity because its comprehensibility does not any more depend on it, but on the fact that the gesture is now memorised as a shared signal–meaning pair. Nonetheless, a codified gesture can also maintain its original iconicity. Many codified gestures are still iconic, even if their iconicity can vary a lot, in terms of how much their perceptual features resemble some perceptual features of the meanings they stand for. Thus, the iconicity of a gesture is not an all-or-none matter: there are different levels of iconicity. But if this is so we ought to be able to find a way to measure the iconicity of a gesture. And this is what stems from our model of iconicity.

## The measure of iconicity

As we have seen, in inventing a creative iconic gesture, among the perceivable features of a meaning to convey, a Sender selects one or more of its perceivable features; but, curiously enough, the selected features used in inventing creative gestures are just the SHAPES of animate or inanimate objects, their MOVEMENTS and their LOCATIONS: the very same features that constitute the parameters of symbolic gestures and signs of the Deaf.

My hypothesis is then the following: Iconic codified gestures, including the signs of a Sign Language, were all born as creative gestures, and the process of codification they went through (Frishberg, 1975; Radutzky, 1987) consisted of a schematisation, stylisation, abstraction, and simplification of shapes, actions, and places, that thus came to be represented into the parameters of handshape, movement, and location. This could explain, among other things, the fact that, when people are told the meaning of an unknown iconic gesture or sign, they can tell why it means that meaning: why it is iconic. As shown by the translucency tests by Klima & Bellugi (1979), we can tell “in what” a sign is iconic; that is, in my terms, the “iconicity relation” between sign and meaning; which are the aspects of the meaning that are represented by the sign, and through which parameters.

If this hypothesis is plausible, it could suggest to us a measure of iconicity and a criterion for predicting how iconic a gesture or sign is, and then how much it is likely to be understood also from people of other sign languages or other cultures (as it was found, for instance, by Grosso et al., 1995; Boyes-Braem et al., 1996; Pizzuto & Volterra, 2000; Pizzuto et al., 2002).

In fact, some iconic gestures maintain iconicity only in one parameter, others in two or more parameters. Among Italian Symbolic gestures, in the *index and middle finger extended open upward* that means “two”, only the handshape is iconic: the two fingers represent two objects, then the concept of number two. *Hitting one’s temple with curve index finger* to mean “mad” is iconic only in its location (head); in the gesture for “indian”, *hand on top of the head with index and middle finger extended upward*, both handshape (= two feathers) and location (= on top of the head) are iconic. The gesture for “to walk”, *index and middle fingers extended downward moving forward alternatively*, is iconic in handshape (the two fingers represent two legs), orientation (forward orientation of knuckles represents forward orientation of knees in walking), and movement (the two fingers move like walking legs).

Since for any gesture it can be computed if and in how many parameters it resembles aspects of the meaning, my prediction is that the more parameters that are still iconic there are in a gesture, the more iconic the gesture is. This provides a criterion to measure iconicity that allows us to predict how understandable a gesture or sign might be even for people who do not know it.

A first confirmation to this hypothesis comes from a study by Roberti (2002) on the iconicity of signs in LIS (Italian Sign Language). The starting point of this research are the studies by Grosso et al. (1995) and Pizzuto & Volterra (2000) that assessed the percentage of recognition of transparent vs. non-transparent LIS signs by Italian and European hearing subjects and by deaf European subjects.

The 40 signs of that research, 20 transparent and 20 non-transparent, were classified by Roberti in terms of the hypothesis above: each sign was attributed a score ranging from 0 to 4, depending on the number of parameters in which the sign was iconic. The results of this analysis were compared to the study by Grosso et al. (1995) on the recognition of LIS signs by Italian hearing subjects, confirming the hypothesis above. Among the signs classified as transparent in that study, all the signs scored 3 with this method were recognized between 64% and 100% by hearing subjects, 80% on average; all the signs scored 4 were recognised between 55% and 100%, 80,5% on average. Of the 20 signs considered non-transparent by Grosso et al. (1995), 9 scored 0 and 11 between 1 and 2 according to Roberti's analysis, and only two of them obtained 4% recognition by hearing subjects.

The signs analysed were also compared to the study by Pizzuto & Volterra (2000) on sign comprehension by Deaf signers of other European Sign Languages, and also in this case the Italian signs scored as more iconic in our terms were recognised more often than signs with a lower score. Specifically, among those considered transparent, signs scoring 3 were understood between 45% and 100%, 76% on average, while signs scoring 4 were recognised between 50% and 97%, in the average 84%; among non-transparent signs, 6 out of 9 signs scoring 0 were never understood, while the remaining 14 signs ranging from score 0 to 2 were recognised between 0 and 92%, 34% on average.

### Direct and indirect iconicity: A matter of cognitive distance

The iconicity relation between a symbolic gesture and its meaning is sometimes quite mediated. When we have to convey an abstract meaning or a referent not perceivable through vision, our mind has to go some inferential steps further to link the gesture to its meaning. Thus I distinguish **directly** from **indirectly iconic** gestures. The iconicity of a gesture may be more or less direct depending on how many cognitive steps it takes to go from its meaning to its physical appearance. In this sense we can distinguish different degrees of iconicity.

1. **Direct iconicity.** A case of direct iconicity in Italian Symbolic Gestures is *opening and closing index and middle fingers* as scissors, that means "to cut".

2. **Metaphor.** The same gesture may also mean “be concise”, by passing through its metaphorical meaning “cut your discourse”. In this case it is **indirectly iconic**, since between the meaning of the gesture (“be concise”) and its form (“cut with scissors”) there is one metaphorical step.

My prediction is that a directly iconic gesture should be easier to guess for a naive observer than an indirectly iconic one, since the latter passes through more steps than the former.

3. **Instantiation.** Another case of indirect iconicity is the device of instantiation: a step from class to example, similar to the Class–prototype relationship seen above. Among Italian Symbolic Gestures, *knocking on some imaginary door* means “to ask or beg for something”. This gesture looks very iconic as to the physical appearance of knocking, but is indirectly iconic since its actual meaning requires one more step of abstraction: to beg is more general than to knock on a door; or, conversely, knocking is an instantiation of begging, or of asking to be let in.

Next we see two cases of indirect iconicity that pass through verbal language.

4. **Copy from verbal expression.** Sometimes the step between form and meaning is a mental image evoked by a verbal expression. The gesture above, besides the directly and indirectly iconic meanings “cut” and “cut your discourse”, also has a third meaning: “*taglia e cuci*” (“cut and sew”) or “*tagliare i panni addosso*” (= “to cut suits over someone”). This Italian idiom means “to spoil someone’s image”, “to gossip about someone”, passing through the metaphor of cutting suits worn by someone, so as to make him ridiculous and show up his flaws. Also in this reading the gesture can be considered iconic, but very indirectly so: it does not imitate the action of speaking badly of somebody, but the action of “cutting” mentioned in the corresponding verbal idiom, which is, in addition, itself metaphorical.

The same holds for the *extended index finger, palm down and inward metacarpus, sliding under the nose*, that means “presumptuous”. The gesture is iconic because it imitates someone touching his nose so as not to sense a bad smell. It evokes the idea of “bad smell under the nose”. “Bad smell under the nose” (“*puzza sotto il naso*”) is another Italian metaphorical idiom referring, through a simile, to the typical posture and expression of a presumptuous person: one who keeps nose always up, who possibly wipes his nose trying to avoid sensing a bad smell (see also Serenari, 2003).

5. **Initialisation.** A typical case of indirect iconicity is the device of initialisation in Sign Languages, where some signs are iconic because they resemble not a visual aspect of the meaning, but the first letter of the corresponding written word. An example from LIS is the sign for *vero* (“true”), where the



V handshape imitates the first letter of the Italian word *vero*. But also among Italian Symbolic Gestures, the *index and middle fingers extended open upward*, glossed with the interjection “Victory!”, is iconic because the two fingers look like the V of “Victory!”.

## Conclusion

By proposing a framework to classify gestures in terms of different parameters, I have argued that the parameter of iconicity cuts across the cognitive construction of gestures: so, while creative gestures are iconic by necessity, codified gestures can be iconic too, and their iconicity can be measured in terms of the number of how many of their parameters imitate features of their meaning, and how many inferential steps are passed through from meaning to signal.

The model presented for the generation of iconic gestures argues that we select the features to imitate according to their distinctiveness, ease of depiction, and the ontological type of the meaning to convey; but when we refer to abstract concepts we state links between perceptual and conceptual. This shows a continuity between the devices of iconicity in creative and codified gestures, and the need for both to find an inferential bridge between concreteness and abstraction, between body and mind.

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