Article

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The Social Construction of Perceptual Categories

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Abstract: In this article I shall argue that the categories a subject employs to codify her perceptions are emergent elements of the social niche her community inhabits. Hence, I defend the claim that categories are primarily elements of the social ontology a certain subject experiences. I then claim that public representations (e.g. icons) shared in a social niche play a crucial regulative role for the members of that community: in fact, they offer a rule (a canon) to conceive a certain type or a certain category, e.g. 'movement', 'time' or 'space'. In this sense, categories function as normative elements.

Keywords: categories, mindshaping, canons, icons, social niche

1 Introduction

This article argues that perceptual categories are socially constructed. I shall claim that categories are to be primarily conceived of as elements of social ontology, that is, emergent social structures. I shall argue that they are the outcome of normative practices, such as the manipulation of public representations. Therefore, I shall argue that these normative practices play a regulative role within a certain human group. To support my thesis, I shall draw on a folk psychology approach called 'mindshaping' (Mameli 2001; Zawidzki 2008, 2013). The term 'mindshaping' was first introduced by Matteo Mameli (2001) as the niche-construction effect of mindreading practices. These practices consist in attempts to learn the intentions of conspecifics or competitors in the niche. Niche-construction is the global effect of all the actions an agent performs to improve its fitness in its ecological environment (Laland, Matthews, and Feldman 2016; Odling-Smee, Laland, and

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Feldman 2003). Mindshaping can be considered as a 'side effect' of our mindreading activity of other minds; considering that our social niche is also composed of mental features which include the minds of others, in order to facilitate mindreading, we undertake a lot of 'side actions' which literally *shape* how others think.

Mindshaping takes place in many different manners: for instance we assume different emotional approaches in different contexts to help others understand us and sympathise with us, or to 'suggest' what attitude they should assume in a particular situation. Therefore, we display an *angry* attitude when someone hits us, we show a *disgusted* face in response to a foul smell, we show a *sad* face when an accident frustrates our plans or we show a *pleased* or *displeased* face observing the practices of others. This is one of the ways we 'teach' others how they should react in specific contexts.

In brief, in this article I define mindshaping as a moulding activity operated by something or someone on the mind of a certain subject, while I define mindreading as the activity of a subject who tries to learn the intentions of the other agents she meets in the niche.[1] Mainstream definitions of mindshaping focus on one mind providing behavioural models to another (Mameli 2001, pp. 614–617; Zawidzki 2013, pp. 31–32), while I focus on representational models emergent in a community. So, in this paper, I adapt the current mindshaping framework to also include mindshaping effects on representational contents through the application of normatively codified representational models. This move allows me to account for the influence of social experience on perception. Therefore, I shall defend the thesis that perceptual categories are the outcome of a collective mindshaping activity emerging in a human community. I shall also argue that such a collective mindshaping activity is mainly mediated by the use of public representations which are mostly icons. More specifically, I propose that when public representations are widely accepted and endorsed in a certain community, they express a particular representational canon which acts as a normative stimulus for the members of such a community. This argument is based on two premises I commit to: a) generally, icons *describe* a certain reality; b) some of these descriptions can acquire a *normative* value among their users so that they produce a collective mindshaping effect: the moulding of categories.

The paper proceeds as follows: in the next three sections (§§ 2–4), I analyse and criticize a considerable omission in the contemporary literature about mindshaping: the role of public images in moulding the minds of others. I shall analyse the original debate and the early developments on mindshaping, considering my proposal a further advancement in the field, complementary to them. Afterwards

1 Although mindreading typically refers to a number of mental state attributions, for the purposes of this paper I will restrict it to intention attribution practices.

(§§ 5–6), I argue that whenever we design an imaginal space, we create public representations of stories: we design an ecological niche (Odling-Smee, Laland, and Feldman 2003) with both narrative and descriptive features by means of the representational artefacts (Heersmink 2013; Norman 1991) we publicly manipulate in our environment.

With the words 'imaginal space' I define a virtual space constituted by a coherent set of images existing in a determinate cultural niche (Laland and O'Brien 2011). In some cases it can be an actual space defined by a coherent series of real images which tell us a specific story: for instance, the figurative representations of a temple telling us the coherent story of a myth.[2] The coherence of the imaginal space is then granted by the narrative structure of the story.

We do not design a social niche (Kendal, Tehrani, and Odling-Smee 2011; Laland and O'Brien 2011; O'Brien and Laland 2012; Ryan, Powers, and Watson 2016; Sterelny 2007) by means of verbal practices only; we also do it directly by representing a certain content through a representational artefact. In this sense, I argue that any artwork can be a vehicle for a content it iconically refers to. Obvious examples are works of political propaganda (such as sculptures and paintings representing a ruler) or works of religious propaganda (like mosaics or frescoes representing God's creation of the universe or the lives of the saints). All these artefacts represent *how the world is* (descriptive function) and *how it has to be conceived* (normative function) to every member of the community living within such a social niche. I shall claim that it is this double nature of such an imaginal space that eventually produces the mindshaping effect within the community.[3]

In section § 2, therefore, I shall briefly summarise the mindshaping theory Matteo Mameli presented in his seminal work; I shall explain his perspective and the reach of this concept in its early formulation. Then, I shall examine in section § 3 Tadeusz W. Zawidzki's contributions to the theory of mindshaping (Zawidzki 2008, 2013): he argues that mindshaping is a primordial cognitive strategy which humans developed during their evolution, a strategy the appearance of which preceded mindreading practises. He focuses both on pedagogy and on a more general tendency people have to transmit practical knowledge to their offspring. In my opinion, Zawidzki pays a lot of attention to the ways people gather and transmit information, e.g. the relationship between a master and her apprentice in any

2 See the temple metopes of the Heraion of Foce del Sele, at the Museo Nazionale Archeologico di Paestum (Italy). The complete series of these metopes is available at "Le metope dell'Heraion del Sele". URL: http://www.culturaitalia.it/opencms/it/temi/viewItem.jsp?language=it&id=oai%3Aculturaitalia.it%3Amuseiditalia-coll_330, visited on 14 June 2021.

3 In fact, those descriptions institutionally recognised as canonical descriptions exert a normative power on the community of the users which makes mindshaping possible (§ 5.2).

technique learning process. However, he just mentions the role a foundational myth plays in giving identity and cohesion to a particular community and in transmitting practical knowledge to future generations. Moreover, he does not consider how we shape the way in which our community conceives itself managing the physical space it lives within: for example, he does not take into account the use we make of architecture to shape the intentions of others towards a specific space; also he does not consider how we use images to create and manipulate mental states in the niche we share with our fellows, like in the case of perceptual categories.[4] In section § 4 I shall analyse some lacunae in the classical mindshaping approach, especially its focus on ethical elements of human dynamics, such as the group transmission of specific customs or adaptive techniques. Instead, I shall propose a mindshaping approach focused on the collective construction of categorial elements: a categorial mindshaping. Finally, I shall devote section § 5 to articulating my proposal: here I shall discuss the mechanism of signification proper to icons. I shall firstly analyse the specific formal properties of icons and which features might influence the perception of their content; secondly, I shall introduce the concept of imaginal space and I shall explain how a particular icon can become a canon and therefore exert a normative power on its users; thirdly, I shall explain how categories can be moulded by this normative use of canonical images.

2 Mameli's Mindshaping Theory

In his paper, Mameli (2001) begins by considering how mindreading works and how it influences our niche construction practices: we are inculturated and aware of our mental states in a very different way from other organisms. This makes us good mindreaders, able to predict the mental states of our conspecifics and their behaviour (Mameli 2001, p. 597). Mindreading is crucial for the main cognitive capacities characterizing the human species, such as language, epistemic progress, cultural evolution and niche construction. So, although signalling is quite a widespread activity in the biological domain, only humans communicate linguistically. The main difference between these two kinds of communication is that in the latter the information receiver attributes the *intention to* communicate to the speaker, while it is not the case in the former. In this sense the ability to

4 I stress here the importance of physical space because, just as a cultural niche interpenetrates an ecological niche (Laland, Matthews, and Feldman 2016), there is an interpenetration between a physical and an imaginal space: indeed, images in the niche are supported by representational artefacts (Heersmink 2013).

attribute communicating intentions to others is just a peculiar mindreading skill (Mameli 2001, p. 598).

Likewise, epistemic progress entails selecting the best problem solving strategy. This implies the capacity to evaluate both one's own and someone else's beliefs and considering their truth value and relevance in a specific context, which is another particular mindreading skill.

Also cultural evolution in humans is characterized by a quick diffusion of ideas, such as the use of a specific tool or jewels and clothes: while other animals just imitate (through social learning) some conspecifics by efficiently using a new tool, humans improve their artefacts by applying a teleological framework ("How could I use this object?") to all the possible uses of a given tool. This practice too is a mindreading skill, it being based on analysing the intentions and possible aims a particular object can activate in conspecifics.

Finally, we live in an ecological niche, a space we gradually build around us each time we perform an action to improve our fitness within our environment. Mental life is an important part of this ecological niche, and it consists of all those beliefs we attribute to others and those of our own we are aware of. Being able to predict (that is, to 'mindread') others indeed has *mindshaping* effects on us (Mameli 2001, p. 599), changing the mental features of the niche we live in. In this sense Mameli rightly observes that our niche construction practices change the selection pressures operating within our niche, both on ourselves and our conspecifics and descendants; this makes niche construction evolutionarily significant.

Making our minds part of the niche we inhabit implies that, each time we act on the niche, we can act on others' minds. We do it through expectancy confirmation, which happens when some object meets the expectations of an observer (Mameli 2001, p. 600). Expectancy confirmation effects are, therefore, mindshaping effects. A mindshaping effect is an effect on the very structure of the mind and its development: for instance, when I tell you I have just broken your smartphone, this *makes you angry*; when a father teaches his son how to tie his shoes, this *makes his son learn* how to tie them (Mameli 2001, p. 608). These are both examples of mindshaping effects.

So, niche construction consists in all those actions an organism undertakes to improve its fitness in its environment. Also, in an environment where minds are a main feature, efficient mindreading is a necessary trait to improve the fitness of an agent in such an environment. Then, mindshaping seems to be a *strategy* to make mindreading easier. It is in this framework that attributing traits and states to others produces expectancy confirmation effects.

In his paper, Mameli presents multiple incisive examples of expectancy confirmation effects. I shall report here just three of them to better explain what mindshaping is:

> A doctor tells one of his patients that she is depressed. As a result she starts looking at her feelings and at her situation in a new light. She starts suspecting that she may really be depressed after all. She sinks into a depression.
>
> […]
>
> A father expects his children to share his own values. The father's expectations put a lot of psychological pressure on the children. As a result of this, the children end up valuing, at least in part, the same things as their father.
>
> […]
>
> A group of people, the W's, think that people belonging to another group, the B's, are violent. Because of this, the B's get to be treated in a special way. Because of this treatment, the B's find themselves in situations that lead them to behave more violently than the W's do (2001, p. 609).

It is clear, then, that specific attributions of mental states by a subject A (her expectancies) to a subject B make A behave in such a peculiar way with B that eventually *shapes* the very mental states of B.

3 Zawidzki's Mindshaping Approach

While Mameli considers mindshaping a particular niche construction strategy aimed at improving our mindreading abilities and our fitness in the niche, Zawidzki points out that it is quite unlikely that mindreading has been selected by evolution for its (alleged) efficiency in predicting the mental states of our fellows. Instead of mindreading, propositional attitude ascription serves, for him, a mindshaping function: it enables us to set up *regulative ideals* to mould the behaviour of others (Zawidzki 2008, p. 194). He argues that folk psychology, the attribution of a psychology based in a belief/desire propositional attitude to others, entails a mindshaping aim: namely, an easier coordination with our conspecifics mediated by folk-psychological rules.

Despite what some theorists assume, mindreading is an inefficient predictive tool because of the "holism problem" (Zawidzki 2008, p. 195): the thesis that any belief/desire couple admits an indefinite number of possible coherent behaviours which invalidates its supposed predictive power. Hence, considering mindreading as the main aim of folk psychology would be very problematic, regardless of whether we adopt a theory-theory or a simulation theory account: in both cases uncertainty would be unavoidable (Zawidzki 2008, pp. 196–198). This is why folk psychology's real importance lies in its mindshaping function. Let's consider, for

instance, the city traffic case: in the risky and challenging environment of the daily traffic in a busy city, there is no way I could know *a priori* the causally relevant mental states which make a person take a certain route just by applying a folk psychology paradigm. There, in the crossroads where the two main roads of the city intersect, I have no time nor means to figure out what is going on in the mind of the driver in front of me. So, how do I manage to avoid the likely crash? It would be a very thorny epistemic puzzle to solve if I could not rely on a well settled *normative system*, like the one formed by traffic signals and driving rules (Zawidzki 2008, p. 199), a normative system that indeed my fellows do not ignore because they have been well socialized to respect it.

So far, it appears clear why mindshaping is an effective and efficient coordination strategy: the normative force of the expectations we have about our conspecifics. We know the normative system, they know it too; they *have to* behave following rule R in context C, while they have to follow rule R′ in context C′. Mindshaping's strength is, therefore, that it is focused on *prescription*, not on *prediction* (Zawidzki 2008, p. 202). Being aware of the normative system prevents us from acting erroneously, thus, avoiding the correspondent sanction. This means that we can interpret others' behaviour by considering what they ought or ought not to do in terms of an external system of rules. These rules are transmitted by explicit or implicit teaching or learned by imitation (Zawidzki 2008, pp. 205–206).

Within this framework, Zawidzki pays a lot of attention to the peculiar, distinctive features of human mindshaping: it generally consists of a mechanism which makes a target subject match a model (Zawidzki 2013, p. 31) and, especially in the case of imitation, it is quite a common phenomenon in various animals. That said, animals always need a concrete and present model, while human subjects can try to match a 'virtual', ideal model. We see an example of this in the legal system, which takes the 'ideal citizen' as a model (Zawidzki 2013, pp. 60–61), or in the use we make of public narratives. "What would Jesus do in my shoes?" a Christian might think before making her choice (Zawidzki 2013, p. 35). This is, I think, the most important point Zawidzki focuses on: in his opinion we use public narratives as 'normative systems' (like the traffic norms in the crossroads example I gave before in this section). Following Victoria McGeer (2007), he suggests that these narratives mainly play a regulative role (Zawidzki 2013, p. 57) among the members of a particular group. So Zawidzki, building on the concept of 'regulative ideal' coined by McGeer, mainly focuses on the mindshaping function of public narratives as a kind of *ethical*[5] regulative factor which leads each member to

5 I am using, here, the term 'ethical' in its wide etymological sense: *ethos* as custom, habit. So, when I say 'ethical models' or 'ethical behaviour', I include all the sphere of practical behaviour. This entails that I do not limit this label to mere moral models, but I include all the instances of

conform to the group narrative. Again, he argues that the main role of group narratives is to teach someone how she should *act* to be compliant with her group (Zawidzki 2013, pp. 52–53, 60). This is, in my opinion, the most critical point of his view. I shall explain why in the following section.

4 What Mindshaping Lacks

As I explained in the previous section, the main feature of Zawidzki's approach to mindshaping is the regulative role models play in influencing the minds of a community. He notes that it is proper to humans to imitate not just actual models (as other animals do), but also 'virtual' ones: namely, *ideal models*. In this case he chooses two representative examples: the ideal citizen, presupposed by the legal system, and Jesus, an ideal model for Christians. Both of them are clearly *ethical models*. In fact, they both represent (within their respective frameworks) an example of 'right' behaviour; they both have an obvious *prescriptive* value. This is why Zawidzki argues that public narratives play a regulative role. He thinks that narratives limit the set of cultural games (in the Wittgensteinian sense) we can play in our culture (2013, p. 58); each narrative affords just its peculiar games. Also, he maintains that narratives have a multi-level digital and sequential structure (2013, p. 58): that is, they directly represent all the steps an agent has to conform to in order to observe the norms of a cultural game. So, when arguing in favour of mindshaping, Zawidzki's main concern is to explain how public narratives influence our *ethical behaviour* within our group. This is because he conceives public narratives in general as abstract systems of norms which regulate our daily life, just as in the traffic norms example. His perspective owes a lot to both McGeer (2007) and Sterelny (2012): he claims that public narratives, like myths and laws, teach us how to act through normative sanctioning (Zawidzki 2013, p. 60) (when the agent fails to abide by the norm) and represent a prototypical behaviour which is socially acceptable for all the members of a certain community. He is quite clear on this point, when explaining that an ideal model such as the protagonist of a myth – which is an *abstraction* of all those values a community identifies itself with – is a publicly recognisable and well known character for everyone (Zawidzki 2013, p. 61). From Sterelny, he takes the idea that intergenerational learning permits a constant flow of information which transmits community rules from the elders to the

customs transmission, such as teaching the fundamental rules of a community, but also teaching the typical strategies the community has developed, in its history, to solve some practical problems: for instance, hunting, fishing or building strategies and the like. Therefore, I use the label 'ethical mindshaping' to also include the case of apprenticeship analysed by Sterelny (2012, § 2.3).

youths. This is important for understanding Zawidzki's position on the function of public narratives: Sterelny (2007, 2010, 2012) focuses on humans' ability to transmit practical knowledge from master to apprentice as an evolutional linchpin – which is, also, one of the most fundamental mindshaping techniques. In this context 'practical knowledge' does not just mean hunting techniques or artisanal crafts. It is also (and more importantly) a set of rules to act fairly within the community: "When children of a culture master the narratives that it affords, what they learn are systems of self-regulation that prevail in that culture", says Zawidzki (2013, p. 58). This is perfectly coherent with McGeer's regulative ideal proposal: she argues that folk psychology is, in general, a constant attempt to understand what others *ought to do* according to our folk-psychological model (normative practice) (McGeer 2007, p. 141) and, consequently, what *we* should find to be the right thing to do according to that model (regulative practise). This is because we feel the necessity to cohere with our interpretative model (McGeer 2007, p. 146). This is the sense in which our interpretative frameworks have a clear regulative function in Zawidzki's view: "Our interpretations of how we and others act are simultaneously instructions for how we and others *are supposed* [my emphasis] to act, and this keeps our behavior in line with our interpretive expectations" (2013, pp. 52–53). This is important, in his opinion, because the main reason for adjusting to a regulative model is, eventually, in order to reliably predict others' behaviour. If I know which normative system is widely accepted within our community – the traffic norms, for instance – I shall be able to predict your reaction in any possible situation relying on that system. This is why, I think, he focuses so much on the behavioural features of mindshaping. Also, he stresses our natural disposition to imitate others to gain group acceptance, like in the 'chameleon effect' (2013, pp. 50–53).

Although I agree with Zawidzki's general approach to mindshaping and its importance in group coordination dynamics, I also believe that contemporary discussion about mindshaping has omitted a very important issue which is the fundamental point I argue for throughout this article: mindshaping provides a mechanism for the social construction of categories through the use of public images.

My point, then, is that we do not experience mindshaping *only* when we learn the right way to sit at lunch and to eat soup, or when we learn how to dress and speak in a given situation, or when we learn to respect traffic norms or the legal system of our community, or when we learn how to fish and hunt and play football. We also experience mindshaping when we learn how *to form concepts*, how *to*

represent and how *to categorize*.[6] We are not just the passive object of others' mindshaping (e.g. a master who mindshapes an apprentice); instead, we mindshape our fellows each time we modify our environment – especially our public narratives – to display *our point of view*. In producing representations, we tell others what they should do to be understandable for us. So, the regulative function of mindshaping is not just displayed at an ethical level; it also manifests itself at a very *cognitive* level. Public narratives do not just tell us about moral examples, *exempla virtutis* which teach us the right way to manage life together; public narratives also describe how things are, not just what the right thing to do with them is. They afford us a *canon* – a rule – to represent reality. I shall call this 'categorial mindshaping'.[7]

The theoretical background of my thesis includes a clear Vygotskian approach to culture, community and thought (Cole and Wertsch 1996; Krueger 2013; Vygotsky 1978, 1934/2012). This is why I contend that manipulating external artefacts like public representations plays a crucial role in structuring human cognition. So, I am sympathetic to the idea that cultural resources have a decisive impact on our cognitive development. In fact, as exhaustively argued by Michael Tomasello (Tomasello 1999; Tomasello and Carpenter 2007; Tomasello et al. 2005; Tomasello, Kruger, and Ratner 1993), integrating the historical dimension of apprenticeship completes the phylogenetic information transmitted to the members of a certain human group, which then influences the ontogenetic cognitive development of individuals. Tomasello noted that the special sensibility for detecting goal-directed

6 The relation between the domain of conceptual and the domain of perceptual is complex and controversial, but an exhaustive analysis of this debate exceeds the aims of this paper. Nevertheless, some remarks could be useful to the reader to get the perspective of this paper with respect to that debate. The theoretical framework of this paper owes a lot to the 4E (embedded, embodied, enactive, extended) cognition paradigm (Malafouris 2013, 2020; Newen, De Bruin, & Gallagher 2018), where the difference between conceptual and perceptual is attenuated. This is particularly evident in the embodied mind paradigm (Heras-Escribano 2019; Shapiro 2019). Also, the literature on this conceptual/perceptual relation includes a certain variety of proposals arguing for a continuity between these two domains, for instance, Barsalou (1999) elaborates a representationalist proposal based on perceptual symbol systems, Prinz and Clark (2004) argue for a pragmatist approach which connects our command of concepts to action, Liane Gabora and colleagues (Gabora, Rosch, and Aerts 2008) propose an ecological theory of concepts highlighting the tight connection between concepts and life activities. Within this framework, I commit to a *scaffolded* approach to the mind (Sterelny 2010): external tools play a regulative role on human cognition, and this is the case of icons with respect to some mental states.

7 As a referee suggests, categorial mindshaping raises questions about the extent of the Sapir-Whorf hypothesis. Perhaps my proposal shares with that hypothesis the point that external representations (public icons, in my case) influence the way we think about reality, yet a proper discussion of this would exceed the focus of the paper.

actions (e.g. gaze following) which characterises humans is a crucial phylogenetic adaptation that made human beings able to ascribe intentions to their conspecifics and other agents in their niche. Also, applying an intentional perspective to their conspecifics made humans able to engage in joint attention interactions (Tomasello 1999, p. 68) which are the grounds for cultural learning. Similarly, some theorists noted that the generalised application of an intentional stance which children use to interpret other agents' goals makes them more akin to adults in their culture and generates a feedback loop (intentional stance-culture-intentional stance) which improves children's skills in interpreting the intentions of others (Michael 2015). All this seems to be decisive in the emergence of teaching activities involving adults and children: effectively, adult members of the group direct the attention of their pupils towards the most *salient aspects* of a particular experience (Tomasello 1999, p. 80) to make their apprenticeship easier. This behaviour has more recently been labelled as natural pedagogy (Csibra and Gergely 2011; Gergely and Csibra 2013): namely, when an expert member in a certain culture performs a particular action, she tries to highlight for the novice those relevant features which make that action significant and the causal chain that explains it, which otherwise would be opaque for the novice. Natural pedagogy entails ostensive communication (Csibra and Gergely 2011, p. 1150) and, more importantly, it is not limited to teaching children, it involves adult learning as well (Gergely and Csibra 2013, p. 128). My proposal indeed resonates with these works, especially with respect to natural pedagogy and ostensive communication: when I speak about the emergence of a collective mindshaping dynamic in a human community, I refer to the reciprocal activity of the integrants of such a community which moulds their cognitive routine. But I focus on a different (and complementary) point: sharing instances of visual artefacts (e.g. icons) in a public space we are able to, both intentionally or unintentionally, *indirectly* shape the minds of our fellows.

In the next section I shall outline my proposal for a categorial mindshaping. In doing so, I shall appeal to the role of public images in moulding the narratives of a community.[8]

8 As a reviewer suggests, someone might object that some internal content (e.g. the language of thought) would primarily constrain the representations people come up with. But I think that, in doing this, she should commit to a defence of the postulate of the intrinsic content (Adams and Aizawa 2001, 2008, 2010), namely, that the human brain generates internal symbols which are intrinsically meaningful and they transfer this meaning to external symbols, which would be otherwise meaningless. Indeed, the implicit commitment of my proposal is for a conception of meaning as the public use of a certain symbol. In this sense, I would rather argue that the external use of a symbol regulates the internal one, so that I agree with Tomasello on the influence of external representations on the internal ones (Tomasello 1999, p. 125).

5 Categorial Mindshaping

Categorial mindshaping closely relates to the emergence of public narratives. As Zawidzki reminds us, an important feature of any public narrative is its digital and sequential development: indeed, he thinks of these narratives as actual *stories*. So they are digital, because they are composed by countable moments, actions or *frames*, to borrow a metaphor from cinema; and they are sequential, because they form coherent sequences of actions. But stories are not just narrative entities, they are *descriptive* too[9]; also, stories are not just oral (or written) artefacts, they are *visual* too. In listening to a story (a myth, for instance) orally shared within a community, elders do not just teach younger members about a hero or goddess' powers, but also about his or her very physical appearance: "White-Armed Hera", says Homer in the *Iliad*, and any ancient Greek could immediately get a concrete and defined image of what Hera would *look like* – this too being a clear example of mindshaping.[10]

Any Greek could also recognize Hera or Heracles on the metopes of a temple, where their story (the public narrative) was told through a *visual* medium. And the

9 Someone might not immediately notice why I remark here the difference between the narrative and descriptive features of a story. The point, in my opinion, is that stories are narrative in that they display an action, for instance what a character does, while they are descriptive in that they give structural information about that character, for instance about her physical appearance. In fact, a certain story can carry the narrative content "Achilles killed Hector", or the descriptive content "quick-footed Achilles". Such a description can acquire a normative status in particular circumstances (§ 5.2), so that future users within the community are forced to think of Achilles in that way. For instance, they might represent him stressing the dynamism of the figure.

10 Someone might doubt that we have here a clear example of mindshaping as I suggest, because this example might appear to some people just as a common case of activation of the imagination. However, I would respond to this possible objection with the following argument: let's consider John and James, two friends having an ordinary chat in a pub. At a certain point of the chat John suddenly says: "Hey, man! Do you remember Peter? I saw him yesterday and he was wearing a very fancy scarlet jacket". James's imagination would be certainly stimulated by this new piece of information, but indeed *no normative mechanism would be involved* in his imaginative process: James has no reason to start using this description John gave him as a reliable representation of Peter.The case of Hera's description Homer gives us in the *Iliad* is, then, completely different: while John's words about Peter are merely a common description without any particular status in the cultural niche they are said, Homer is instead offering a representative description whose normative character is determined by the very position Homer's poem occupies within the ancient Greeks' cultural niche. Certainly Homer (just as Hesiod) was considered as an 'institution' and, then, all the information he provided about gods, heroes and cosmology was accepted – in that context – as the most reliable one. This is why it is not possible to consider Homer's description of Hera as a trivial case of imaginative stimulation, while it constitutes indeed a genuine case of categorial mindshaping.

same can be said of Christians with reference to the lives of the saints, represented in the mosaics of the Byzantine basilicas or in the cycles of frescos of the Italian Renaissance cathedrals. But the key point here is not just the ethical mindshaping that the narrative level of each story implies: the key point, here, is the categorial mindshaping entailed by its descriptive level. When you look at a metope from the cycle of Heracles, you see a *frame* of a story, but you can also learn what Heracles looked like: you do not just learn that Heracles was brave (ethical mindshaping) fighting against the centaurs, you also learn that he had long hair curled in braids and a beard (categorial mindshaping). In the same way, entering a Byzantine basilica, you do not just learn that St. Paul was a Roman persecutor of Christians who suddenly converted to their religion; you also learn that he was almost bald and had a large beard.

So, categorial mindshaping refers to all those descriptive elements of a public narrative (especially the visual ones) which shape our categories, teaching us *how to imagine* a certain subject. Categorial mindshaping also includes any other attribute which, by description, can mould the global image we have of that subject: this is, for instance, any public mention of flavours, smells, textures and sounds. In this article I have decided to focus just on visual elements, postponing to future investigations a more global development of my thesis which will include a detailed analysis of all these descriptive components I am not able to examine here. I focus on visual attributes in public narratives because they manifest a more apparent normative aspect, being based on a public visual artefact which works as a model for our mental representations and to which anyone can appeal as a reference.

I shall argue through this section that this visual information can be codified within an *icon*, available in our ecological environment. I shall argue that, within our ecological niche, we build a lot of architectures and spaces which allow us to organize *systems of icons*; I shall call these spaces *imaginal spaces*. They represent a visual version of public narratives and they have a descriptive value (e.g. "Heracles looked like this and this") but, as they are publicly shared, they also get a *normative value*: they establish a public canon for any future representation of that subject. In this way, the icons we share in our ecological (and, at this point, *cultural*) niche are a clear medium for our self-regulative practices.

In the following subsections I shall explain why icons are so important for mindshaping, what an imaginal space is and which self-regulative practices this schema implies.

5.1 The Importance of Icons

First of all, I must clarify what an icon is.[11] An icon is generally defined as a sign which directly refers to its referent through a similarity relationship (Eco 1975/2016, p. 309). But, what does 'similarity relationship' mean? This has been a thorny and long-debated question in semiotics since the early criticisms of this ambiguous Peircean definition. In 1946, Charles W. Morris defined a sign as genuinely 'iconic' as far as it has the *same* properties of its *denotata* (Eco 1975/2016, p. 306). Obviously, following this literal definition, only a duplicate could be considered as a proper icon and even a portrait would merely be a partially iconic sign: it just reproduces *some* of the original features of the subject, such as her colours (but, clearly, not her texture!). Umberto Eco, in his famous *A Theory of Semiotics*,[12] argues that any iconic sign just reproduces some salient properties of its *denotatum* (Eco 1975/2016, § 3.5). This means that each time we produce any iconic representation of a concrete subject, what we are actually doing is a translation from our perception into a *graphic code*; something like a similarity transformation in Euclidean geometry (Eco 1975/2016, pp. 307, 309–315): the schematic drawing of a hand is a graphic translation, a bijective transformation (point by point) of the perceptive schema of the hand I see, into a definite graphic code. This is the representational canon and, to perceive it, any subject needs specific 'training' (Eco 1975/2016, p. 309), namely, he needs to know the *transformation rule* applied to that particular instance.[13] However, in this context a transformation rule should be primarily considered as a *procedural* rule, an algorithm, not yet a norm. It should only be considered to be a norm when a particular procedural rule (which might be initially just applied individually) succeeds in being widely recognised as a valid representation within the community and endorsed as such (§ 5.2).

11 In this section I will not distinguish between *icons* and *hypoicons*. I will not differentiate between a particular artefact and the visual information encoded in it; in fact, I consider that this distinction, so typical in Peircean semiotics, is unfortunate because it keeps the door open for Platonism. Although thinking of an icon as the visual information instantiated in various hypoicons could be a useful logical abstraction for the individuation and the analysis of that information, there is no real reason for postulating any general content as separated by concrete hypoicons.

12 To write this article I used the Italian edition of this book as a reference. See (Eco 1975/2016) in the references.

13 For instance, in Euclidean geometry, a similarity transformation follow this rule: "Figure A′ ought to have the same angles and the same ratios between distances as Figure A".

Starting from this premise, I shall refer to iconicity as a kind of isomorphism between a real object and its graphic representation, regulated by a definite transformation rule.

This isomorphic relation is crucial in my view because, just as the actual object presents a certain number of perceptual constraints so do relative icons. What I mean is that the icon itself manifests many physical or, better, *graphical* constraints too.

It is generally said that the most important contribution of Gestalt psychologists (Köhler 1947) consisted in emphasising the top-down constructive component of perception, namely, the subject's re-organization of proximal stimuli. However, I suggest we should instead emphasise the structural constraints that form the ground of any local perceptual instance. Let's consider for example the well-known Kanizsa's images (Kanizsa 1955): both the white triangle in Figure 1 and the square in Figure 2 do not physically exist; they are perceptual top-down constructions based on proximal stimuli. Nevertheless, no subject could perceive a circle instead of a triangle or a square. This is because of the physical (in this case, graphical) structure of the object of perception: it manifests certain structural constraints that afford us *only* a delimited geometrical re-organization of the proximal stimulus.

So, icons present *structural information* which constrains our perception of their content, which is derived from the real referent of the icon by means of an isomorphism. These constraints are also called 'forcing functions' because they are intrinsic properties of the representation which force the usage of that representation in a determinate way (Norman 1991, 2013).

Let's analyse, now, the following icon (Figure 3): it represents a famous biblical episode.

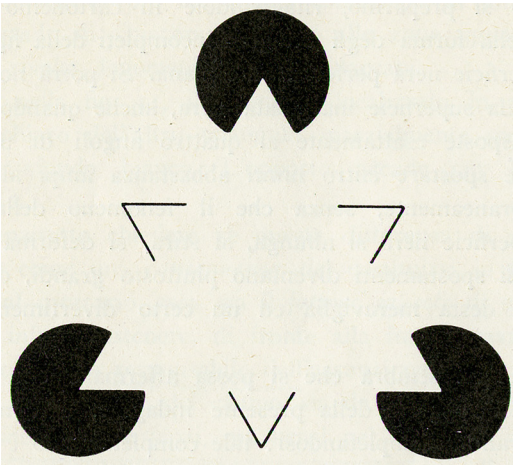

Figure 1: White triangle with no-gradient borders produced by amodal completion.
Source: Kanizsa (1955). Courtesy of Aspi – Archivio Storico della Psicologia Italiana.

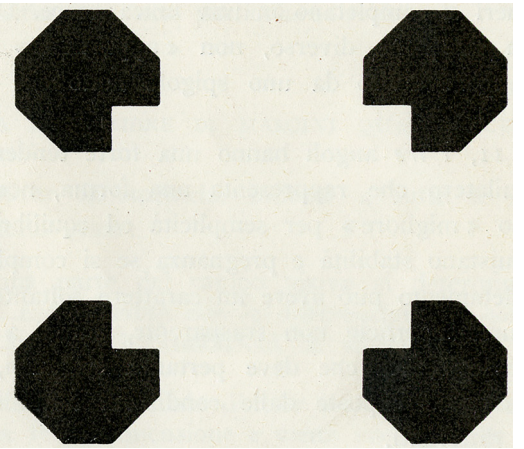

Figure 2: White square with no-gradient borders produced by amodal completion.
Source: Kanizsa (1955). Courtesy of Aspi – Archivio Storico della Psicologia Italiana.

Figure 3: White marble low relief representing Jesus with his disciples next to the sea. Master of Cabestany (XII century), Museu Frederic Marès (Barcelona, Spain).
Source: Museu Frederic Marès © Photo: Guillem F.-H. Courtesy of the Museu Frederic Marès.

Here is the problem: how can we decode the icon's meaning if we have no knowledge of the transformation rule governing the isomorphism? We can achieve this by appealing to its structural properties, the graphical constraints of the icon; we can try to find the rule through *abduction*. Romanic sculptures are rather symbolic and unrealistic in the representation of subjects, although we can focus on some unambiguous perceptual elements of this image. It is superfluous to mention here the wide literature about human specific cognitive ability to perceive and recognise faces, even in conditions of poverty of the perceptual stimulus, so it is easy to explain the immediate recognition of the three human(oid) figures carved in the marble. But all the rest of the scene is confused. What does its base represent? The unique unambiguous element is the prevalence of repeated sinuous lines: it could be water, but also sand or even grass. Further, how can we know what kind of object is represented under the two smaller human figures? It could be a boat, a wooden pressing basin for grape, or even a striped cloth. Yet, we have an important discrimination element: there are some *animals* sketched at the base of the image (both eyes and mouths are immediately recognisable); they are fishes (Figure 4).

So, there is no doubt that the sinuous lines refer to *water*. Now the context is much clearer: those two men are in a *boat*; they are sailors or, maybe, *fishers*. So, what the graphical constraints of the icon push us to see is a scene where a man is pointing at those two fishers from the shore.

Figure 4: White marble low relief representing Jesus with his disciples next to the sea. Master of Cabestany (XII century), Museu Frederic Marès (Barcelona, Spain).
Source: Museu Frederic Marès © Photo: Guillem F.-H. Courtesy of the Museu Frederic Marès. Detail representing some fishes in the sea. Modified by the author.

Many Christians could recognise the *isomorphic* biblical episode of Jesus calling Peter and his brother Andrew, who were fishing in the Sea of Galilee.[14] Many of them could indeed recognise the figure of Jesus since there is the crossed halo behind his head and the blessing gesture of his right hand (Figure 5). A person learned in Latin could even recognise the Latin words '*Pax vobis*', 'Peace to you', on the book (the Gospel) he holds in his left hand.

All these last symbolic elements are accessible just to those who already know the referent of this icon, namely the biblical story. But my main aim in this section was to argue that the very graphical structure of an icon contains information that *shapes our minds*, forcing us towards a particular interpretation of its content. This is because no graphic transformation rule is completely arbitrary: the physical structure of the referent imposes its determinations as in any isomorphism.[15]

In the next subsection I shall explain how a particular transformation rule acquires a normative power within a community, modifying its regulative practices and mindshaping its members.

Figure 5: White marble low relief representing Jesus with his disciples next to the sea. Master of Cabestany (XII century), Museu Frederic Marès (Barcelona, Spain).
Source: Museu Frederic Marès © Photo: Guillem F.-H. Courtesy of the Museu Frederic Marès. Detail representing Jesus blessing and holding the Gospel. Modified by the author.

14 See this biblical episode in the Gospel, Mc 1, 16–20.
15 About this point, see also (Eco 1997/2016, § 2.9).

5.2 Constructing an Imaginal Space: The Normativity of the Canon

I have established that an icon is connected to its referent by means of an isomorphism; also, that this isomorphism is regulated by a transformation rule, which is actually the very rule chosen and applied by the author of the icon to translate some relevant perceptual features of an object into its graphic representation; yet, this isomorphism might still follow a rule applied individually. How does this rule mindshape the members of a given community?

This point may appear to imply an individualistic notion like Victoria McGeer's notion of self-regulation; indeed, she argues that each time that we apply a folk psychology scheme to our fellows we do not consider what they *could* do, but what they *ought to* do. All of us adapt ourselves to our folk-psychological scheme of rules because of a personal coherence necessity, and this results in self-regulation. In this sense, self-regulation is an individualistic notion. But, in spite of the apparent similarity, I cannot rely on an individualistic perspective such as that implied by self-regulation to explain categorial mindshaping which, in my approach, is mediated by icons: there is no reason, in effect, why we should expect the development of a self-regulative dynamic in the individual use of a certain transformation rule by an individual agent. Rather, my position is that each agent can mindshape her fellows by redesigning the shared cultural niche. And a cultural niche is also a space characterized by a plethora of images; in this sense a cultural niche is also an imaginal space.

So my claim is that any author (namely, any icon producer) might influence others using shared icons which encapsulate the transformation rule, that is the rule she has chosen. Then, categorial mindshaping becomes *possible* when a transformation rule is made public; the transformation rule is instantiated in the visual artefact (the icon) shared in the niche and such an artefact becomes a new perceptual stimulus for the other agents in the niche. The formal properties of the icon constrain the number of the possible subjacent transformation rules to be interpreted (through abduction) by the other agents (§ 5.1). This is the first condition of possibility for mindshaping, even though it is not sufficient. In fact, this does not imply any normative power yet, because an hypothetical agent *A* can see and immediately reject the rule afforded by the work of an agent *B*, who shares the same niche.[16] And this is, after all, a mindshaping effect too.

Hence, to get normative power a certain transformation rule has to become *publicly recognised* as the best transformation rule. I argue that this is made

16 Let's think of the common case of a visitor of an art exhibition who does not understand the meaning of a painting.

possible via two different salience factors: the *importance* and the *diffusion* of the icon within the niche in question. This means that a particular transformation rule can be recognised as the best transformation rule by the community if the icon is officially situated in a place[17] of particular importance and authority for the group (e.g. a temple), in such a way that it can get institutional value[18]; or if it is widely reproduced and diffused within the cultural niche (e.g. commercial products and artisanal iconography, such as mythical figures on Greek amphorae).

Let's consider, now, Figure 6: it is a metope of a Greek temple in Paestum, southern Italy which represents Heracles defeating and killing the giant Alcyoneus.

Metopes were situated outside the temple, placed in a sequential line above the columns; they were available for that community at any time and, by ostension (Eco 1975/2016, p. 349), they provided the *correct canon* to represent a determinate subject. They provided a *referent* (e.g. the figure of Alcyoneus) to people who did not already have one, or regulated the referent for those who had it. In this case the value of the icon is related to its location, but it can also be due to the widespread presence of its instances within the niche, such as on the surface of everyday items: for Greeks it could be mythological figures represented on amphorae (e.g. sirens and satyrs); for us it could be soft-drinks bottles commercialized in our social

Figure 6: Heracles defeating the giant Alcyoneus, temple metope of the Heraion of Paestum (VI century BC).
Source: Museo Archeologico Nazionale di Paestum (Paestum, Italy). Photo by Velvet 2011, reproduced under the Creative Common CC BY-SA 3.0 License.

17 About this point, see also (Eco 1975/2016, § 3.4.10) on 'toposensitivity' of signs.
18 In fact, this is the reason why a personal moral disposition, belief or statement is not normative in so far as it does not belong to a legal code recognised by the community. This is because an *institutional value* is recognised in the legal code.

niche. This suggests to me an interesting example: the globally recognisable icon of Santa Claus as a jolly chubby old man in red clothing began to spread after being reproduced on the bottles of a famous soft-drink, thus becoming the official canon for the representation of this character.

Then, any new icon is at first just a 'proposal'[19] for a new canon. But, depending on its impact on the community, it may be recognised as the most effective representation of its referent and, hence, as a model, a *norm* for the reproduction of future instances of the same kind. However, the normativity of an icon is twofold. In fact, on the one hand it can mould users' representations of things in a contentful manner (see the previous commentary on Figure 6); on the other hand, the transformation rule encapsulated in the icon suggests a formal norm for representation. In this sense the mindshaping effect of icons acts both at the semantic and the syntactic level: for instance, the metope in Figure 6 offers both a canon for a certain content (Heracles killing Alcyoneus) and a canon for the formal realization of the figures (a determinate anatomy).

5.3 Shaping Categories Through Images

I have demonstrated that by means of icons we can mindshape our fellows both in representational and categorization processes, giving them rules for iconic reference. In this subsection I discuss the most salient ways we use categorial mindshaping to convey both theoretical information (e.g. information about a state of affairs) and practical information (e.g. communicating the sense of time or a kinetic category such as 'displacement', 'fight' or 'escape').

As I explained in § 5.2, as soon as it is made public, an icon becomes *ipso facto* an act of ostension (Eco 1975/2016, p. 349). Thus, it should be considered as equivalent to a declarative proposition.[20] Let's consider Figure 7: it is a mosaic of

19 I use the word 'proposal' here because of the naturally ostensive feature of any icon which, as an instantiation, *offers* or *proposes* a transformation rule. Then, even though it is true that any icon is a peculiar instantiation of a determinate transformation rule, this rule should not be considered as a norm yet: in fact, despite its nomological structure, it is only a *procedural* rule (an algorithm) for the construction of a certain artefact which may (or may not) be accepted by the community. However, this procedural rule might become publicly recognised as a norm – a canon – depending on its impact within the cultural niche in question.

20 As a reviewer states, icons may play different functions. Indeed, as in the case of traffic signs, they can have a straight normative function. However, my focus in this paper is directed to those cases where this normative function is not so apparent but it is exercised through certain declarative properties of the icon. Related to this, the same reviewer points out a possible difference between those icons referring to a representational unit or component and those referring to a representational complex. But I think that, in this context, even a representational unit should be

the cycle of the Old Testament, in the Cathedral of Monreale (Sicily); it represents the creation of the stars and the planets. This act of ostension is *declaring* a state of affairs to any spectator within the niche: it states "This is the Universe, these are the stars and the planets which actually exist".[21] Hence, this icon mindshapes the agents of the niche about the 'real' structure of the Universe.

Moreover, categorial mindshaping can mould kinetic categories too. This is the case with all those icons whose subject is an action, for instance a race or a fight, like in this fragment of a Greek frieze representing a battle between Greeks

Figure 7: Mosaic representing God's creation of stars and planets (XII century).
Source: Cathedral of Monreale (Palermo, Italy). Image in the public domain.

treated as a declarative element: for instance, the icon [fishes] is to be considered as declaring "These are fishes" (§ 5.1). I mean, the propositional character of an icon does not depend on representational complexity, but on the very identification of a determinate referent which constrains the others (e.g. fishes → sea → boat).

21 Certainly, this content is context-dependent: Figure 7 is just a frame of a complex sequence of scenes representing the biblical history from the beginning of time.

and Amazons (Figure 8): the structural information of this icon (e.g. the tension of anatomies and clothes, the position of shields and swords) conveys the *movement of the struggle*; it provides a rule for the representation of the fight. Hence, it shapes its users to think of action and movement in terms, for instance, of muscular tension.

Likewise, an icon can provide, through its graphic structure, a canon for the representation of time.[22] We have a good example in Figure 9, where the icon is communicating to us both the content of 'before' and 'after' by means of reiterating the same subjects both in the background, in the middle of the painting, and on the proscenium: it is the story of the Creation of Eve; we see the Devil's temptation through the offering of the Fruit of Sin; finally, the Expulsion from Eden. So this icon, through its structural subdivision of spaces, displays the *flow of time* and *provides a rule* for representing this flow: namely, it establishes a direct relation between distances in time and space, and eventually shapes its users' minds to think of time in terms of space.

Indeed, there could also be biological constraints involved in the shaping of perceptual categories (Feldman 1997; O'Connor 2014; Sloutsky 2010), but this claim is not incompatible with my approach. In fact I have not argued that biological constraints are irrelevant for perceptual categories – just the claim that social experience is relevant as well. For instance, let's consider again the case of movement. The neuroscientist Vittorio Gallese applies the mirror-neuron

Figure 8: Battle of Greeks and Amazons, Fragment of a frieze from the Mausoleum of Halicarnassus (IV century BC).
Source: British Museum (London, UK). Photo by Marie-Lan Nguyen, 2011, reproduced under the terms of the Creative Commons CC-BY 2.5 License.

22 For an introduction to the representation of time in paintings, see (Calabrese 2006, pp. 69–99).

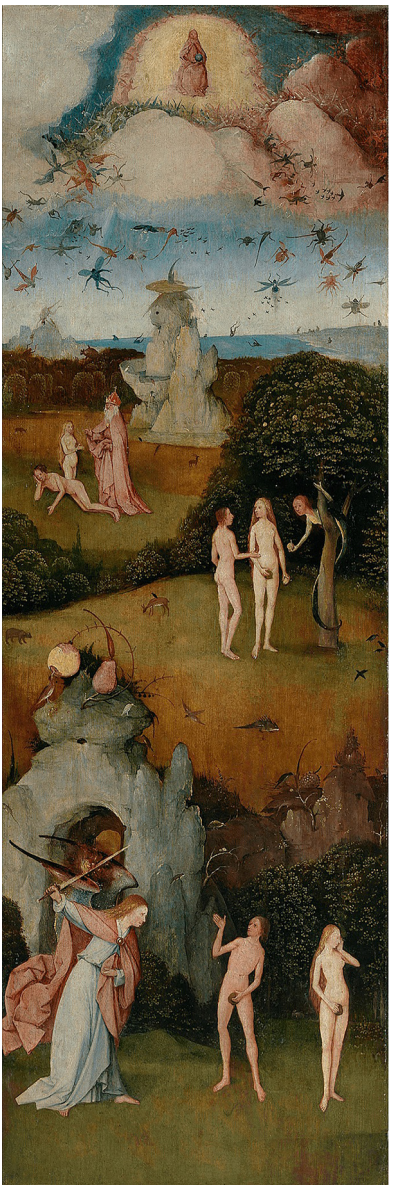

Figure 9: The Haywain Triptych, Hieronymus Bosch (1516), Museo del Prado (Madrid, Spain); detail representing the expulsion of Adam and Eve from Eden.
Source: Trivium. Art History Platform. Image in the public domain.

paradigm (Rizzolatti and Craighero 2004) to movement recognition in visual art (Freedberg and Gallese 2007). I do not oppose his work. However, I would say that, even accepting the universality of the mirror-neuron system and its influence in the perception of movement in visual artworks, our understanding of a certain representation as representing, let's say, 'muscles' is indeed a matter of representational normativity.

6 Conclusions

In this article I tried to outline the main reasons in favour of a mindshaping practice which, through the public use of images, moulds the very categories of our mind. I called this practice 'categorial mindshaping', as opposed to the 'ethical mindshaping' which philosophers of folk psychology tend to focus on.

The most important aim of this article was to demonstrate that categories primarily are elements of social ontology. I have argued for this thesis by demonstrating that the public use of images constitutes a normative system which affords representational canons to the agents of a group, ultimately moulding their categories through a collective mindshaping effect. This is the regulative function of public icons. It is clear that these canons, depending both on the structure of the icons and that of the niche a certain community lives within, are continuously redesigned by the agents who use them. Namely, public representations play a regulative role as emergent canons because they afford particular categorial possibilities to their users. This means that public representations, once they have acquired the status of *canonical* representations, carry out a regulative function with respect to the individual members of the community. Therefore, the categories emerging in this community are shaped in conformity with such canonical representations, so that they regulate the acts of reference acceptable for the members thereof. I claim that these dynamics are responsible for the emergence of types and categories as elements of the social ontology proper of a human community. In this article I have also tried to demonstrate that the existence of a normative system as a consequence of the public use of icons does not only mould 'static' categories (such as types) providing a determinate referent; also this use shapes individual minds, providing members of a determinate community with canons for the representation of 'dynamic' categories such as 'time' and 'movement'.

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