On the multiplicity of artifacts: A typology including regulatory artifacts

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There are various studies on specific types of artifacts. Many of them have focused on "technical artifacts" and "cognitive artifacts"; and, more recently, other studies have examined "regulatory artifacts". However, a general typology is still lacking. This article aims to build such a typological framework based on the identification of three macro-categories of artifacts — i.e. behaviour-supporting, behaviour-engaging, and behaviour-influencing — and on the identification of ten sub-categories within them: (i) descriptive artifacts; (ii) technical artifacts; (iii) cognitive artifacts; (iv) detecting artifacts; (v) ludic artifacts; (vi) artistic artifacts; (vii) status artifacts; (viii) deontic artifacts; (ix) constitutive artifacts; (x) steering artifacts. On the basis of this typology, five points are highlighted. First, the suggested typology illustrates how many human activities are mediated by some kind of artifact; we could say that artifacts have not only been the product of human intelligence but they have also been an active trigger of it. Second, the proposed typology sheds light on the fact that artifacts can perform not only traditionally, widely discussed technical or cognitive functions but also regulatory ones. Third, if regulatory artifacts are also considered, the maker's intentionality is confirmed as being of central importance in defining what artifacts are. Fourth, the proposed typology shows that the different types of artifacts produce their effects in different ways: in certain cases, their performance is for instance mainly based on causal mechanisms, whilst in other cases on mainly symbolic mechanisms. Fifth, the typology illuminates significant differences between humans and animals.

Keywords: Artifacts, Typology, Functions, Intentionality, Regulatory artifacts

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1 Introduction

There are various interesting studies in the literature on specific types of artifacts: for example, many of them have focused on "technical artifacts" (e.g., Kroes, 2012) and "cognitive artifacts" (e.g., Norman, 1991). More recently, some other studies have examined "regulatory artifacts" (e.g., Lorini et al., 2021, 2023). However, a general typology explicitly including this last case is still lacking. This article aims to build such a typological framework. The discussion is organized into four sections: Section 2 makes some preliminary specifications; Section 3 presents a new typology of artifacts; Section 4 discusses the findings; and Section 5 concludes.

The article is mainly theoretical and analytical; however, it is empirically informed and illustrated.[1] It is based on an extensive interdisciplinary literature review.[2]

2 Preliminary specifications

Artifacts are physical objects intentionally created to perform a specific function (e.g., Hilpinen, 1992). They have a teleological nature; they are *for* something. In other words, they have a certain "*for-ness*"; they are means "*for* doing something" or "*for* achieving ends" (Kroes, 2012, p. 36). Artifacts are therefore clearly different from both natural objects — e.g., a tree growing in a wild forest — and simply manipulated matter — e.g., scrap material like the sawdust generated as a by-product of woodworking processes (Baker, 2004; Dipert, 1995; Lind, 2024). Five preliminary specifications are necessary before beginning the central section of this article.

First, in what follows we are primarily concerned with human-designed and human-constructed artifacts.

Second, when speaking of artifacts, we refer exclusively to three-dimensional material-physical artifacts. Any kind of entirely "abstract", "virtual", or "immaterial" artifact[3] is therefore excluded a priori from the analysis.

Third, the distinction among the various kinds of artifacts presented here is based on the primary function[4] that an artifact performs.[5] Because such objects are "artifacts", this function prima facie coincides with that intentionally attributed to them by their authors or makers (Chaigneau et al., 2016; Chaigneau & Puebla, 2013). In other words, the intentionally attributed function has a privileged status. As Houkes (2006) notes: "A chair can be used to stand on or to bar a door with, but using it for sitting on has a privileged status" (p. 111). In the case of artifacts, both the object's existence and its main properties are causally dependent on the intention (Hilpinen, 1992, p. 61). In some sense, artifacts embody the maker's intentions.[6] This obviously does not imply that this intention is a necessary and (also) sufficient condition for any

artifact to serve a purpose; obviously, the artifact must also have objective characteristics – e.g., structural features – that make this effectively possible.[7] To give an example, the creator of a traditional sorghum broom may also imagine that he/she is intentionally creating an aerial means of transport, but its structural characteristics are not such as to allow such kind of travel. Furthermore, underscoring that the function performed by artifacts is prima facie the one attributed to them by their first maker obviously does not mean that they cannot be re-purposed by new makers or subsequent users. In this case, some scholars suggest the notion of "improvised functions" (Heersmink, 2021).[8]

Fourth, focusing on the functional dimension of artifacts as prima facie coinciding with that intentionally attributed to them by their makers obviously does not imply ignoring the social context in which those artifacts can and will exist.[9] Ultimately, the makers themselves cannot but take also the social-cultural context into account when conceiving and creating an artifact. For example, designing and producing simple and inexpensive automatic/electric screwdrivers make sense if people at large give importance and meaning to the self-assembly of prefabricated furniture (IKEA type).

Fifth, in proposing a typology, we obviously recognize that it is always possible to imagine intermediate or frontier cases; however, for the purpose of this article the typology seems sufficiently accurate. As is well known, various other typologies of artifacts have been developed in the literature.[10] All of them highlight interesting and often complementary aspects. Our aim is to extend the scope of the analysis so that it also includes various categories of what we call "regulatory artifacts". In certain cases, our typology therefore implies a broadening of categories in comparison with others; in other cases, it is simply a refinement of them.

Note that our effort to construct a typology is not an effort in ontology (i.e., a study on the essential features of entities[11]); nor is it one in cognitive psychology (i.e., a study on how humans effectively recognise, interpret and categorise certain items[12]). It is instead an intermediate endeavour with the theoretical (and critical) intent of shedding new light on certain aspects – especially, the regulatory dimension of certain artifacts.

3 *A new typology*

In light of the aforementioned assumptions about artifacts functions,[13] our proposed typology is based on the identification of three macro-categories of artifacts – i.e., behaviour-*supporting*, behaviour-*engaging* and behaviour-*influencing* – and on the identification of ten sub-categories within them. The sub-categories comprise different ways in which artifacts *support* (in the first case), *engage* (in the second), and *influence* (in the third) behaviour (Table 1). We do not claim that the sub-categories are exhaustive but instead

Table 1 A typology of artifacts

Macro-category	*Sub-category*
Behaviour-supporting	Descriptive artifacts Technical artifacts Cognitive artifacts Detecting artifacts
Behaviour-engaging	Ludic artifacts Artistic artifacts
Behaviour-influencing	Status artifacts Deontic artifacts Constitutive artifacts Steering artifacts

that they include exemplary cases. Even if this point is not the focus of our main discussion, we think it is of interest that ludic and artistic artifacts are included in the same macro-category in the proposed schema.

Note that the three macro-categories identified imply three different ways in which artifacts "mediate" the relationship between individuals and the world.

While artifacts with epistemic and technical functions (i.e., those in the first part of the list) have been traditionally and extensively investigated, as well as artifacts with a ludic and artistic dimension (i.e., those in the intermediate positions of the list), artifacts with a regulatory function (i.e., those in the final part of the list, namely artifacts explicitly created in order to guide/channel behaviour) have only recently been explored in depth (for some first investigations, see Franssen, 2006; for recent developments, see Lorini et al., 2021, 2023; Lorini & Moroni, 2022a).

Note that the adjective "regulatory" is used here in a broad sense to denote behavioural-influencing − behavioural-change-inducing − artifacts, which may coincide with norms/rules but do not necessarily do so (i.e., the notion of "regulation" employed here is broader than that of "norms/rules"). What we term "regulatory artifacts" could alternatively be described as "artifactual nomoids" (the term "nomoids" in this sense first appeared in Lorini & Moroni, 2024).

3.1 Descriptive artifacts

Descriptive artifacts are those artifacts that are used to describe something − i.e., to convey certain features of something − to someone. Typical examples are a globe, a medical manikin (that mimics human anatomy and physiology), or an architectural building model. In this last case, consider for example the 3D model created to depict the ongoing state of construction

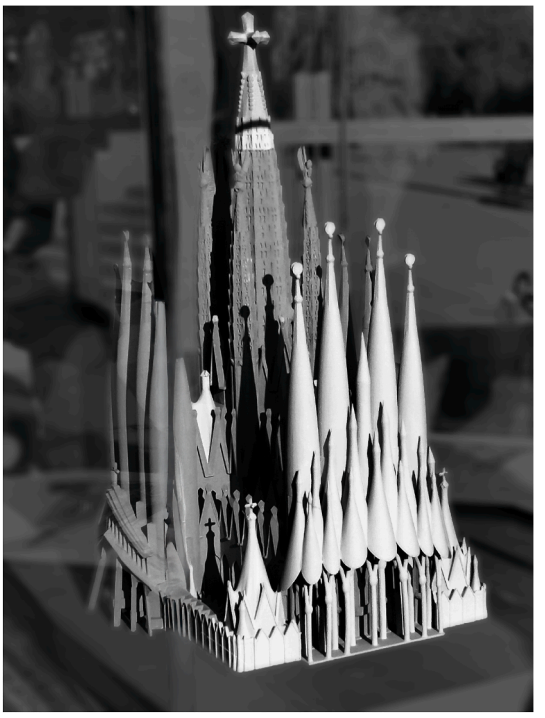

Figure 1 Sagrada Familia (Barcelona), 3D model (authors' photograph)

of the Sagrada Familia church in Barcelona where the model, placed in front of the building, shows what has already been built and what will be built (Figure 1). Interestingly, models of this kind are in some cases also designed to describe architectural artifacts to blind people; this happens, for example, in Cosenza (Italy) where, inside the cathedral, there is a 3D model expressly designed to help blind people grasp (with their hands) the size and shape of the church, or in Savona (Italy), where a 3D model of the physical regeneration of the old port has been constructed for the same purpose (Figure 2).[14] Note that the point here is not how accurate a representation is — nor is it the platitude that the representation is not the reality — but the fact that artifacts of this kind are explicitly created with the function of describing something to someone. Note, moreover, that in the case of design and architectural models, we have artifacts describing other artifacts.

3.2 Technical artifacts

Technical artifacts are artifacts designed and constructed to perform a "technical" function stricto sensu.[15] Their purpose is to instrumentally help someone's action, not to expand their mental capacity or to change their behaviour. Everyday examples of artifacts of this kind are hammers, screwdrivers, nutcrackers, knives, vacuum cleaners, chairs, jars, umbrellas, and fitness machines. Various curious inventions of the past, now clearly obsolete,

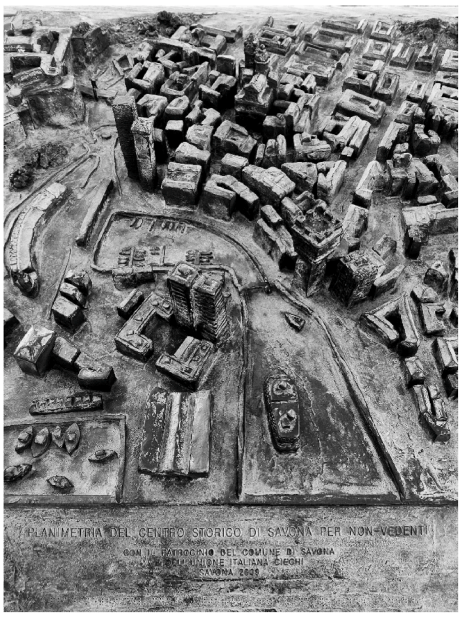

Figure 2 Port of Savona (Italy), tactile 3D model (authors' photograph)

can also be mentioned here, such as the finger and toe stalls (in some cases crafted from gold) used in Ancient Egypt to prevent digits from breaking during the burial and mummification processes (Colazilli, 2012) or the moustache guard used to avoid getting one's moustache wet while sipping a drink (Twickler, 2018).[16]

3.3 Cognitive artifacts

Cognitive artifacts are artifacts that improve human cognitive performance, facilitating certain mental tasks; for example, storage of information, calculation, and combination. As is well known, Donald Norman introduced the concept of cognitive artifacts in the 1990s. He highlighted that cognitive artifacts can be defined as man-made tools that store, display or manipulate information (Norman, 1991). Along the same lines, Heersmink (2016, p. 79) notes that the function of cognitive artifacts is to supply information relevant to a task, supporting internal memory and thought processes, and to simplify, speed up, improve the accuracy of, or even make possible, certain cognitive activities.[17] Typical examples of cognitive artifacts in this sense are abacuses, calculators, computers and smart phones. An interesting point here is that so-called out-of-context artifacts are often (recognized as) cognitive artifacts (because of their level of sophistication).[18]

3.4 Detecting artifacts

Detecting artifacts are artifacts explicitly designed and employed to detect (e.g., test, measure, appraise) a phenomenon of some kind. Examples are

Figure 3 "Gallo di Ramperto", the oldest surviving weathercock in the world (dating back to 820 A.D.); Museo di Santa Giulia, Brescia, Italy (©Archivio Fotografico Musei Civici di Brescia – Fotostudio Rapuzzi)

windsocks, weathercocks (Figure 3), litmus papers, Covid swabs, breathalysers, metal detectors, thermometers, hygrometers, and computed axial tomographies.[19] Interestingly, examples of detecting artifacts are frequently present in works of fiction; consider the Sword in the Stone, Cinderella's shoe (expressly considered by Searle, 1983 to discuss the issue of direction-of-fit) and even Pinocchio's nose (on which, see the discussion by Eldridge-Smith, 2018).[20] Considering more recent fiction, another noteworthy example is the so-called *Voight-Kampff* apparatus – a fictional device introduced in a well-known novel by Philip K. Dick (1968), and also depicted in the 1982 film inspired by it, *Blade Runner*. It is used to determine whether a subject is a human being or an android ("replicant"). The *Voight-Kampff* apparatus operates by measuring involuntary physiological responses – such as pupil dilation and eye movement – to emotionally provocative questions. The underlying assumption is that androids lack

genuine empathy and therefore do not respond in the same way as humans when confronted with situations designed to elicit an emotional or empathetic reaction (for interesting reflections on this, see e.g., Sturdee et al., 2016; Reeve, 2015).

3.5 Ludic artifacts

Ludic artifacts are those artifacts that have been created primarily for entertainment and amusement – mainly for children, but not only for them. They have a sort of hedonic function (Beckman, 2002). Consider spinning tops, yo-yos, playing cards, toy cars, dolls, teddy bears, rubber ducks, rocking horses, and sand buckets. As Legaard (2022) notes, designed toys are intended for immersion into a state of wonder and for exploring emotions tied to the play experience, without serving any purpose beyond the act of playing itself (p. 175). According to Levinovitz (2017), toy-play differs fundamentally from game-play, with one of the main distinctions being that players typically experience greater agency when they engage with toys (p. 270). Levinovitz (2017) also notes that this distinction is reflected linguistically: we "play games", but we "play *with* toys" (p. 267).

3.6 Artistic artifacts

Artistic artifacts are artifacts explicitly designed and constructed as artworks. As Dipert (1986, p. 405) notes, the ontological status of works of art, along with the criteria used to distinguish them as individual entities, likely depends on the intentions ascribed to their creator; only those properties of an object that are seen as intentionally produced are considered relevant to the artwork itself. Compare with Levinson (2007), "Artworks are necessarily artifacts, since they are things intentionally brought into being through human agency" (p. 82). Examples here are artistic sculptures like those by Auguste Rodin or Constantin Brâncuşi. Obviously, not all works of art are artifacts in the physical-material sense which interests us here; however, many artworks are the explicit result of artistic physical manufacturing. Artistic artifacts, too, can be regarded as having a function (Gilmore, 2011), but we admit that in this case defining the function is more complex (Stecker, 1994). However, if the term "aesthetic" is used in a very broad sense – including form, content, integrity, etc. – one could say that the main function of artistic artifacts is to provide some kind of aesthetic arousal and satisfaction.[21] This obviously does not prevent artistic artifacts – like other kinds of artifacts – from also having secondary functions.[22]

3.7 Status artifacts

Status artifacts are those artifacts that have the purpose of showing – making known, evident – a person's status/role.[23] In doing so, they influence how other people perceive a person and the kinds of behaviour that are possible/adequate towards him/her or in his/her presence. Interesting examples in

this case are police uniforms, military insignia, religious vestments, mourning clothes, chains of office, and wedding rings. In all these cases, (status) artifacts mediate social interactions: they signal roles and cue expected behaviours. A wedding ring, for instance, indicates that someone is married, and suggests to someone else what could be acceptable or unacceptable behaviour towards them. In this case, "unmarried people are not supposed to make advances to married people, and vice versa. Married people benefit to the extent that they do not receive unwelcome advances. Unmarried people avoid embarrassing encounters" (Hindriks, 2020, p. 487; compare with Uller & Johansson, 2003; Voracek, 2008; Billari et al., 2007; Roversi et al., 2013). Consider also the opposite case described by Nicolas (2009): "A recent trend among single people is to wear a [Singelringen], a silver band covered with a bright acrylic upper layer (which has a crescent cut out of it) as a means of more directly and clearly signaling their status as single than would wearing no ring at all" (p. 530).

Similarly, mourning clothes – e.g., black attire – communicate grief and loss, signaling that the wearer should be approached with sensitivity and solemnity. Such clothing does not merely represent the personal emotion of mourning but also operates as a public cue that influences the behavior of others – allowing them to offer appropriate support, maintain respectful distance, or engage in rituals of condolence. In discussing the history of mourning dress in the West (from 1800 to 1900), Bass-Krueger (2023) observes that "mourning dress […] helps mediate between inner emotions and the outside world" (p. 393) (on the history of mourning dress, see Taylor, 2009).

Another quite original case here is the so-called *Calabrese hat* (Figure 4). This hat, made of felt with a feather on it, became the external sign of patriotic sentiments during the Italian revolutionary riots of 1848, conveying a specific signal to others.[24] This kind of hat was also called a "Ernani hat" due to the fact that a similar hat was worn in Giuseppe Verdi's melodrama *Ernani* (Andreu, 2023; Sorba, 2006, 2011).[25] In this case, the hat not only identified its wearer as sympathetic to the revolutionary cause but also aligned mutual expectations among supporters.

3.8 Deontic artifacts

Deontic artifacts are regulatory artifacts that perform a *prescriptive* function: they prohibit or impose a certain behaviour in a non-verbal way. Deontic artifacts are generally – by their nature – *situated objects*; that is, objects that need to be installed in a particular place to be able to exercise their function and have an influence (Lorini et al., 2021, p. 10). This particular feature differentiates them from other artifacts (e.g., certain technical and cognitive artifacts) that do not usually need to be in a definite spatial context to perform their function. Deontic artifacts can influence the behaviour of recipients only in praesentia. In this sense, deontic artifacts generally have a "deictic"

Figure 4 Calabrese Hat (authors' drawing)

(Lorini et al., 2021; Lorini & Loddo, 2017) or "indical" nature (Loddo, 2023) because their distinct deontic meaning is closely linked to precise space-time coordinates (on this issue, see also De Franco & Pacchi, 2024). Examples are traffic lights (i.e., artifacts specifically designed to impose, through the use of coloured lights, individual rules on motorists preparing to proceed across an intersection); traffic signs; roundabouts regulating the access and circulation of vehicles at road intersections (Figure 5); fences used to indicate prohibited access to certain areas; and barrier tapes (Figure 6).

Final examples of very particular deontic artifacts from the Italian medieval period are the niches, cavities, and recesses on the facades or internal parts of old churches or public buildings (e.g., in Modena, Bologna, Rimini, and Assisi, see Figure 7) that were used as mandatory templates (e.g., for the shapes and sizes of bricks and tiles) in business transactions. These artifacts were used to standardize construction materials, so that uniformity of dimensions for building purposes was ensured (Lugli, 2010). They can be considered deontic artifacts because the direction-of-fit in this case requires, as in all the other examples considered above, that it is the world (e.g., bricks and tiles) that must correspond to the artifactual template. As Fiorini (2016) writes in this regard: "In medieval Italian communes, craftsmen and traders had to follow many rules to ensure the honesty and regularity of the trades. All the members within the same administrative district had to use the same systems of linear measurements and weights. [Templates] […] of these were displayed on the walls of public buildings" (p. 47).

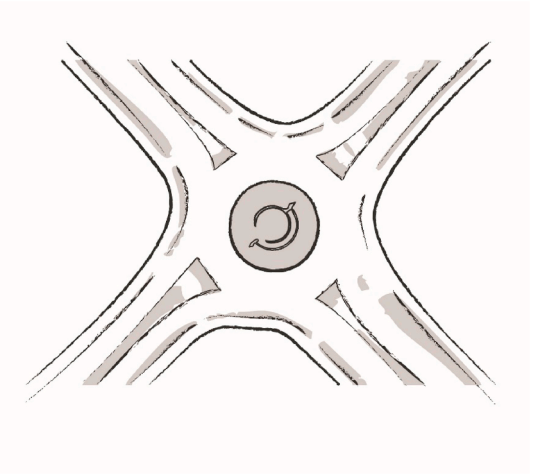

Figure 5 Roundabout (authors' drawing)

Figure 6 Barrier tapes in Milan (Italy) (authors' photograph)

3.9 Constitutive artifacts

Constitutive artifacts are artifacts that perform a *constitutive* function (Lorini et al., 2023).[26] They are those types of regulatory artifacts that, unlike deontic ones, do not prescribe any specific human behaviour directly. They are instead artifacts that create new institutional realities (that continue to exist and persist as long as the constitutive artifact that produced them remains in place) which indirectly affect behaviours.[27] Constitutive artifacts act in the world of *institutional facts*. In short, they create a new institutional state of affairs in the place where they are installed. Constitutive artifacts are therefore situated objects too.

Figure 7 Recesses on the apse of Modena Cathedral (Italy); to the left of the window, those used to standardize/measure the dimensions of bricks; to the right, those used to standardize/measure the dimensions of roof tiles (authors' photograph)

In sum, while status artifacts signal an institutional reality, constitutive artifacts typically create institutional realities.

Searle (1995) suggests imagining this example: a wall built by a primitive tribe around its territory to clearly demarcate it (p. 39). Even if the wall were to progressively deteriorate (for example, diminishing in height due to the collapse of some stonework) it would still continue to perform its constitutive function because this depends not so much on its physical structure as on its symbolic dimension. In this case, a mere wall — that is, a physical barrier — becomes a symbolic barrier. The wall is a constitutive artifact because it determines, with its presence, the existence of a specific institutional reality; namely, a "political border".

Concrete examples of constitutive artifacts include buoys used to directly establish specific areas within marine environments (e.g., buoys that delineate a boundary in the water without any pre-defined limits or markers besides the buoys themselves) or specifically shaped demarcation stones determining the boundary of a plot of land.

Note that in *Deuteronomy* (19:14) there is this prescription, "Do not move your neighbor's boundary stone set up by your predecessors". According to John Calvin, moving a boundary stone — for instance to enlarge one's property at the expense of a neighbour — is an act of double deceit, because it is both an act of theft and one of false witness (Kaiser, 2012).[28] Consider also what Plato stresses in the *Laws* (book VIII): "None […] shall move a neighbour's boundary-stone of his own free purpose" (see the English translation by Taylor, 1934, p. 231).

Effectively, many laws of the past were very severe in regard to the removal of boundary stones. "The removal of boundary-stones was prohibited and considered a serious crime according to Babylonian, Egyptian, Greek and Roman law" (Potter, 2022, p. 83). Even legends highlight this kind of crime.[29] This seems to testify that certain boundary objects were more than mere landmarks. As Mancin (2020) notes in this regard, boundary stones could be the result of the materialization on the ground of constitutive maps of borders; however, it is equally possible to hypothesize that the actual boundaries depended in certain cases on the stones, and that the movement of these entails their redefinition (p. 14). In the latter case, these artifacts do not merely indicate a pre-existing boundary, they bring it into being. Without them, the institutional fact — such as the boundary — might not exist. This situation highlights the generative role of constitutive artifacts.

It is of interest to recall here that *Terminus* was identified by the ancient Romans as the god of boundaries and was usually represented as a boundary stone with a head on its top (Huskey, 1999; Madsen, 2023). *Terminus* was, for instance, mentioned by the Roman poet Ovid in the *Fasti*.[30]

A final example of constitutive artifacts is provided by the objects (bags, pieces of wood, etc.) that children playing football in an urban square or a field put in place to constitute the position and size of the goal. This illustrates that, even in informal situations, very simple artifacts can generate an institutional setting.

To conclude, and with reference to the direction-of-fit, note that in the case of constitutive artifacts, it is not possible for the world to fail to match the artifact: through the artifact, the world is immediately altered and cannot but match it (Lorini et al., 2023).[31]

3.10 Steering artifacts

Steering artifacts are regulatory artifacts that perform a regulatory function without a deontic force.[32] They are a case of regulation-without-rules tools (Lorini & Moroni, 2024) or rule-free regulation tools (Lorini & Moroni, 2022b). By employing such artifacts, it is possible to regulate behaviour without imposing prescriptions. Steering artifacts, differently from deontic artifacts, regulate behaviour without an intrinsic *deontology* (in Searle's sense). In other words, they do not entail deontic structures such as rights, obligations, claims, authorizations, commitments.

Typical examples of steering artifacts are various kinds of traffic calming devices; for instance, speed bumps to slow down traffic (a speed bump does not indicate a precise speed limit; instead, what it does is hamper the transit of a vehicle, "persuading" the motorist, by means of its physical shape, to

slow down); rumble strips (e.g., center line, shoulder or transversal rumble strips) (Noyce & Elango, 2004; Persaud et al., 2004; Wu et al., 2021); chicanes designed to decrease vehicle speed (Distefano & Leonardi, 2019; Lee et al., 2013; Zhang et al., 2020); and particular silhouettes positioned along roads to prompt drivers to drive more carefully (usually, they are in the shape of a human person installed at the roadside on hazardous stretches to signal places where fatal accidents have occurred: Tromp et al., 2011).

More curious examples are the following, waste paper bins designed to look like hoops used in basketball games (thereby giving a different meaning to the action itself of throwing rubbish into them); the *StandardToilet*, that is, a toilet deliberately designed to be uncomfortable in order to discourage use for a protracted period in, for instance, airports or train stations (it has a slanting downwards angle of 13° that makes it quite uncomfortable to sit on – thus preventing its use for more than a few minutes: Lorini & Moroni, 2022b); the so-called Pythagorean cup – also known as the "Greedy cup", "Justice cup" or "Tantalus cup" – which is an old kind of drinking cup that operates on a principle of fluid mechanics to ensure that a person drinks wine in moderation. The cup is constructed in such a way that if the drinker imbibes a moderate amount of liquid it behaves like any other cup, but if the drinker exceeds a certain level, all the liquid escapes through a hidden siphon (Buber, 2024).

A final example – clearly debatable from an ethical point of view, but nevertheless interesting from an analytical one – is represented by artifacts utilised by so-called hostile design or hostile architecture (also termed disciplinary architecture, exclusionary architecture, and defensive architecture: Rosenberger, 2017, 2020a, 2020b, 2023; Chellew, 2019; McCreath, 2025; Nielsen, 2024; Smith & Walters, 2018). An example is sleep-prevention benches, that is, benches with an uneven surface or with metal dividers that are unusable for any purpose other than sitting (Figure 8); or metal studs implanted in the ground (known as anti-homeless spikes: de Fine Licht, 2020; Petty, 2016) in order to discourage homeless people from resting or sleeping there. Note that sleep-prevention benches and metal studs do not imply a *rule* against people lying on benches or on the ground. Hostile architecture aims to discourage certain behaviours even if they are not explicitly prohibited by any legal norm.

4 *Discussion*

On the basis of the previous sections, five main points can be highlighted.

First, the suggested typology vividly illustrates how our living environment is characterized by the presence of innumerable artifacts with multiple functions (Sudjic, 2009). Today, the *artifactual* environment conditions our life even more than the *natural* environment (Kroes, 2012). Indeed, one of the most striking features of human life is that we inhabit an environment shaped and filled to

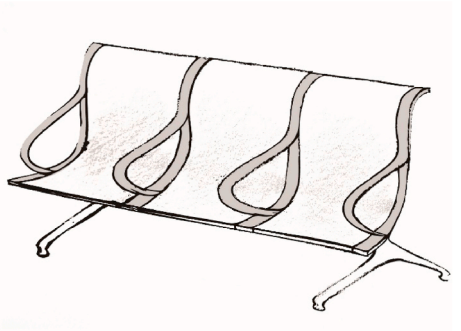

Figure 8 Sleep prevention bench (authors' drawing)

an unprecedented extent by products of our own making (Margolis & Laurence, 2007). Carrara and Mingardo (2013) note: "We live in a world where not only artifacts, but also kinds, and kinds of kinds of artifacts seem to be countless" (p. 352). In short, the vast majority of human activities are mediated by some kind of artifact (Verbeek, 2005, 2006). A crucial feature of human development has effectively been the shift from a direct mode of interacting with the world to one mediated by some external device (Omicini et al., 2009, p. 159). This mediation has remarkably increased over the course of human history. Consider a very simple artifact like a hammer. The first hammers – made with stones attached to sticks by means of strips of leather and animal sinew – date back to 2,400,000 BC; today, more than 50 main types of hammers are in use and they are produced in innumerable shapes and colours by a huge number of producers.[33] We could also say that artifacts have not only been the *product* of human intelligence but, also, an active *trigger* of it. To quote Baker (2004), "without artifacts, there would be no recognizable human life" (p. 99).

Second, the proposed typology sheds light on the fact that artifacts can perform not only traditionally, widely discussed technical, cognitive, artistic, etc. functions but also regulatory ones. In short, there are not only artifacts that function as *behaviour-supporting* or *behaviour-engaging* devices but also ones that function as *behaviour-influencing* devices. Although the latter have to date received scant attention, they are crucial both in themselves and to gain better understanding of the general phenomenon of artifacts. Note that, if we accept the idea that there are also regulatory artifacts, it is easier to understand certain phenomena. For instance, the example of the border wall presented by Searle and mentioned above no longer seems a case that is strange or difficult to classify (and not even an example of how difficult it is to distinguish between technical and social artifacts: Kroes, 2012, p. 14). It is simply a regulatory artifact and, more precisely, a *constitutive* one.

Third, if regulatory artifacts are also considered, the maker's intentionality is confirmed as being of central importance in defining what artifacts are.

Especially in the case of deontic artifacts, constitutive artifacts and steering artifacts, it is the regulatory intention that sets their primary or privileged function.

Fourth, the different types of artifacts produce their effects in different ways (Pols, 2013). In certain cases, their performance is mainly based on *causal* mechanisms (as in the case of technical artifacts like screwdrivers or hammers), whilst in other cases the artifact's performance is instead based on mainly *symbolic* mechanisms (as in the case of deontic artifacts like traffic lights). Furthermore, certain artifacts perform their role only through an interaction with the user's body (again, as in the case of technical artifacts), whilst in other cases they perform their role without a body interacting with them (as in the case of constitutive artifacts). Moreover, in certain cases artifacts have an institutional dimension (as do status artifacts), whilst in other cases they have no institutional dimension (like technical artifacts) (Thomasson, 2003).

Fifth, the proposed typology illuminates a significant difference between humans and animals — one that is perhaps more a question of degree than something invariable and structural, but anyway important. In the case of humans, the number and variety of (kinds of) artifacts used is huge. In the case of animals — and only for some species — artifacts are mostly technical. As Gould (2007) notes, the vast majority of animal artifacts are for hunting and foraging or for protection and shelter. Sometimes animals use their own body products (e.g., silk and wax) to create these kinds of artifacts; at other times they use external materials (e.g., stones, shells, vegetation).

To quote Margolis and Laurence:

> The image of 'man the tool-user' has been complicated by recent discoveries about the ecology of non-human animals […], but it is still quite reasonable to point to theoretically significant facts about human artifacts that may distinguish us as a species. Even if non-human animals might be said to produce artifacts of their own […] it bears explaining why we humans are so much prolific in the types of artifacts we create and why we are so much more flexible and creative in how we use them. (2007, p. ix)

Along the same lines, Skibo and Schiffer (2009) note, "Beavers build dams, birds build nests, and chimps use and even make an occasional tool, but we are the only species that, figuratively, bathes constantly in an environment of our own artifacts" (p. 6). Finally, Heersmink (2021) highlights, "How humans build and use artifacts is unique in the animal kingdom in terms of complexity, variety, and the principles involved in the design process" (p. 574).

Gould (2007) recognises that a clear difference between human-made artifacts and animal-made artifacts is also that, in the latter case, even if it is possible to

identify a more flexible and goal-oriented behaviour in some species, the vast majority of artifacts are created according to "innate specifications" and using a set of "inborn instructions" (p. 266).

In any case, having new typologies can also enable continuation of this type of research in new directions with reference also to the animal world (for further fascinating discussion on animal artifacts, see Hansell, 2005; Fragaszy et al., 2013; Shew, 2017).

5 Concluding remarks

This article has attempted to construct a new typology of artifacts. It has done so in particular by including various types of – often ignored – *regulatory* artifacts. The article has been mostly theoretical, with all the advantages and disadvantages of such an approach. A limitation is the generality of the treatment and a certain degree of simplification. Nonetheless, the hope is that this approach can anyway prove useful for highlighting some significant general aspects. The objective, however, is to develop our research also in a more experimental direction.

CRediT authorship contribution statement

Stefano Moroni: Writing – original draft, Supervision, Funding acquisition, Conceptualization. **Anita De Franco:** Writing – review & editing, Visualization, Methodology, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

No data was used for the research described in the article.

Notes

1. The article is based on longstanding empirical investigation in the fields of artifacts in general, and regulatory artifacts in particular, by one of the two authors (previous publications resulting from this investigation – started in 2018 – will be cited throughout the article), and on a recent research project on non-linguistic normativity (started in 2023) in which the two authors are involved and that explores various empirical dimensions of artifacts' use (this specific research project is indicated in the funding recognition).
2. The starting search conducted on Scopus for this purpose (considering "article title, abstract and keywords") involved the following search string: "artifacts" AND "function" AND "typology" OR "taxonomy".
3. Consider, for instance, discussions on law as an artifact (Burazin, 2016; Burazin et al., 2018) and on institutions (e.g., marriage) as artifacts (Roversi et al., 2013); or, also, discussions on musical works as artifacts (Irmak, 2021) and even fictional characters as artifacts (Terrone, 2023).
4. In very general terms, the idea of "function" can be defined as follows: "The function of something (S) describes how it works (W) in a particular context (C)" (Lind, 2024, p. 128). In our case, "S" is an intentionally produced object, i.e., an artifact. The way in which S "works" (W) can imply that S has, for instance, a causal or symbolic influence in C. For the critical debate on the notion of "function" itself, see the seminal works by Hempel (1965), Cummins (1975) and Kitcher (1993); more recently (and with a specific focus on artifacts), see e.g., Vermaas and Houkes (2003, 2006), Borgo et al. (2009), Preston (2009), Crilly (2010), Borgo et al. (2011), Mizoguchi et al. (2012, 2016), Bahr et al. (2019), Artiga (2023), and Hurshman (2023).
5. Obviously, there could also be "secondary", and "incidental" functions of artifacts (Ruben, 2022), but the focus here is on the main original function assigned to artifacts.
6. On the issue of "intentionality" in the case of artifacts, see Bloom (1996), Veermas & Houkes (2006), Vieu et al. (2008), Borgo and Vieu (2009), Reed (2013), Heersmink (2022). Compare with Iseminger (1973), Zangwill (2007), and Hughes (2009).
7. It could be said that every artifact has a kind of "capacity space" (Borgo & Vieu, 2009). Compare with Davis (2020, p. 77 ff.). Note that even what we call "regulatory artifacts" require certain physical features (besides their symbolic dimension) in order to perform their (regulatory) function. For example, a traffic sign must have a certain height, shape, orientation, clarity of colours and markings, etc. in order to be visible to cars passing even at considerable speed. In short, if a traffic sign does not have certain material-physical characteristics it cannot *de facto* perform its regulatory function.
8. Consider the case of ready-mades, which are technical artifacts transformed into artistic artifacts by an artist. Examples of these include the bull's head that Picasso created by combining a saddle and a bicycle handlebar; the urinal and the bicycle wheel that Marchel Duchamp transformed into works of art; the forks that Bruno Munari transformed by twisting their prongs into hands performing various gestures. On ready-mades, see Humble (1982), Evnine (2013), Hick (2019) and Folland (2020).
9. For the discussion on the social dimension of artifacts, see e.g., Preston (2006), Scheele (2006), Skibo and Schiffer (2009), Thomasson (2014), Pearce (2016), Juvshik (2023), and Paek (2023).
10. See e.g., Heersmink (2013, 2021, 2022), Garbacz (2006), Tromp et al. (2011), Borgo et al. (2013), and Jarzabkowski et al. (2012). On the problem itself of constructing taxonomies/typologies of artifacts and identifying different kinds/types of artifacts, see Ahn (1998), Sloman and Malt (2003), Crilly (2010), Nanay (2013), Chaigneau et al. (2016), Marconi (2019), Möller et al. (2021), and Juvshik (2025). See also works in formal ontology available online, e.g., http://ebi.ac.uk/ols4/ontologies/iao (accessed June 2025).
11. See e.g., Elder (2007), Thomasson (2009), Franssen et al. (2013), Mansouri and Tayebi (2023), and, for certain respects, also Sattig (2021).
12. See e.g., Sacchett and Humphreys (1992), Kemler Nelson et al. (2000), Tucker and Ellis (2001), Asher and Nelson (2008), Futó et al. (2010), Kelemen et al. (2012), Dellantonio et al. (2013), Puebla and Chaigneau (2014), Banerjee et al. (2015), Nguyen (2020), and Fong et al. (2024). The fact that this article is not a work in cognitive psychology

obviously does not mean that empirical psychological studies on how individuals (for instance, young children) categorize various artifacts cannot be (indirectly) of help.

13. Here we assume a sort of continuity between what can help in defining what artifacts are and in identifying categories/kinds of artifacts. For a different view (based instead on a discontinuity between these two aspects), see Koslicki and Massin (2025).
14. A further, rather curious, example is at the Guggenheim Museum in Venice, where certain 2D artworks are reproduced in 3D to enable blind people to feel them. In short, they are 3D tactile descriptions of 2D artworks. For this initiative, see https://www.guggenheim-venice.it/en/learn/programs-for-accessibility-and-inclusion/double-meaning/ (accessed November 2024).
15. On the "technical" function (of artifacts), see e.g., Kroes (2001, 2002, 2003), Vermaas and Houkes (2006), Houkes and Vermaas (2004, 2010, 2014), Hughes (2009), Crilly (2010), and Borgo et al. (2014).
16. An interesting issue here is represented by what we could call fake technical artifacts; that is, artifacts which are intrinsically bound to fail in achieving a certain aim. Consider, for example, voodoo dolls which are effigies of someone in which pins are inserted in the conviction that this will create effects (e.g., pain) on the real person; consider also the use of certain amulets or talismans for apotropaic and propitious functions (Colazilli, 2012; Faraone, 1991). In this regard, Preston (2009, p. 217) interestingly speaks of phantom functions (of artifacts), "This occurs when a type of artifact is regularly reproduced to serve a specific function, but no exemplar of it has ever been structurally capable of performing that function, or, in the nature of things, ever will be". See also Preston (2013, p. 177 ff.). For discussion of Preston's view, see Holm (2017), and Parsons (2019).
17. On cognitive artifacts see also Nemeth et al. (2006), Carroll et al. (2013), Heersmink (2013, 2021), Fasoli (2018), and Júnior and Karasinski (2023).
18. As – according to some – in the case of the famous "Antikythera mechanism" (Freeth et al., 2021; Seiradakis & Edmunds, 2018; Wright, 2007).
19. A much-discussed example is the polygraph (understood mainly as a "lie detector" rather than a "truth machine"); see e.g., Underwood (1995), Gibson (2001), and Roth (2016).
20. A famous *fake* detecting artifact is the "Mouth of Truth"; that is, a marble mask placed since 1632 in the pronaos of the Basilica of Santa Maria in Cosmedin in Rome. According to an old legend, it will bite off the hand of any liar who places his/her hand in its mouth (Barry, 2011). One of the most famous scenes in the 1953 movie *Roman Holiday*, starring Audrey Hepburn and Gregory Peck, takes place in the narthex of Santa Maria in Cosmedin. Peck guides Hepburn there just to see the Mouth of Truth. It is interesting that Sigmund Freud wrote, in a letter to Wilhelm Fliess, that he had tried the Mouth of Truth when he was in Rome (see the letter in Masson, 1985, p. 449). Another example of fake detecting artifacts is the hot iron that was used in "trials by ordeal" during the Middle Ages – i.e., *iudicium ferri candentis* (Kerr et al., 1992; Pilarczyk, 1996).
21. Hanfling (1995) writes, "I have argued that works of art, like other artifacts, must be understood in terms of their function, which is to provide an appropriate kind of satisfaction. This brings me to a functional definition, as follows: a work of art is an artifact of a kind whose main function is to provide aesthetic satisfaction to others" (p. 37). On this issue, see the discussion in Iseminger (1973), Wieand (1980), Dipert (1986), Hilpinen (1992), Levinson (2007), and Zangwill (2007). For the debate on this issue, see also Parsons and Carlson (2008).
22. It is interesting to note that Borges (1980), when discussing literature and poetry, maintains that, beyond any other type of satisfaction that they may furnish, the primary one is – always and typically – aesthetic.
23. This category is inspired by what Searle (1995, 2005, 2006) refers to as "status indicators". Two clarifications are necessary in this regard. First, in our case, the aim is not merely to highlight the "signalling" nature of certain artifacts, but also their capacity to influence behaviour. A similar – albeit not identical – approach is developed in Smith et al. (2020), who draw attention to an aspect they consider to be neglected by Searle: "Many status indicators play an important role also in the realm of deontic powers" (p. 51). See also Hindriks (2023), "Status indicators […] signal how people

can converge on convenient ways of interacting" (p. 144). Second, after enumerating various functions of status indicators, Searle (1995) surprisingly attributes to them a primarily constitutive role. He writes, "Such indicators serve not only epistemic functions but other functions as well — expressive, ceremonial, aesthetic, and most importantly, constitutive" (p. 120). However, this claim is problematic; if an individual who is not a police officer dons a police uniform, this does not, in itself, make him/her a police officer. Indeed, Searle (1995) himself concedes that his earlier claim is not entirely accurate, revisiting the example of the uniform: "Of course, the uniform does not constitute being a policeman, but it does symbolize a status-function" (p. 120). For further discussion and development of Searle's notion of status indicators, see e.g., Brey (2003), Hindriks (2003, 2012), Nagy (2012), Siniscalchi (2019), and Smith et al. (2020).

24. See Peverelli (1852, p. 130) and Venosta Visconti (1904, p. 49). As Romani (2015) writes: "From being a symbol of the 1799 Sanfedisti reactionary movement […] during the [Italian] revolutionary riots of 1848 [this hat] became a widely popular expression of freedom. Patriots in the north of Italy began wearing it when, during the 1847 Calabria insurrections, five southern patriots […] were summarily executed by Ferdinand II's soldiers in the aftermath of a failed attempt to organize an up-rising in Reggio Calabria" (p. 12).
25. One ironic approach to status artifacts is exemplified by *Pastafarians*, that is, members of the so called "Church of the Flying Spaghetti Monster" that arose in 2005. They are famous for their request — also discussed in various courts decisions, even by the European Court of Human Rights — to wear a colander for the photos on their identity card or driving licence (Brzozowski, 2021; Cliteur & Zoethout, 2023; Dowdy, 2018; Martin, 2020).
26. As regards the distinction between the prescriptive/deontic function and the constitutive function, see the fundamental works by Rawls (1955), Searle (1969) and Carcaterra (1974). Our discussion of constitutive artifacts refers more precisely to the particular type of constitutive rules that Conte (1986) termed "thetic-constitutive rules"; that is rules such as the following, "The age of majority is set at the age of 18" (art. 2 of the Italian Civil Code). For further discussion of these issues, see Żełaniec (2013).
27. According to Lorini et al. (2023) "a constitutive artifact performs the same function of what Searle calls a *declaration*"; from this perspective, "constitutive artifacts are three-dimensional material declarations" (p. 215).
28. See Calvin's *Commentaries on the Four Last Books of Moses*: "He who fraudulently removes a landmark is already convicted by this very act, because he disturbs the lawful owner in his quiet possession of the land; whilst he who advances further the boundaries of his own land to his neighbour's loss, doubles the crime by the deceptive concealment of his theft" (Calvin, 1854, p. 121).
29. In old Scandinavian traditions, for instance, the *deildegast* (i.e., the "markstone ghost", Lindow, 1978) was the ghost of a person "who had appropriated land illegally by moving boundary stones. According to these legends, when the perpetrator died, he was forced to haunt the area relentlessly, carrying the boundary stones for eternity" (Eriksen, 2018, p. 112). The first mention in the literature of a *deildegast* (a name derived from *deild* which means "mark stone" (Grambo, 2009) is in the Norwegian poem *Draumkvedet*, from about 1200.
30. As Ovid writes, "When night has passed, let the god be celebrated. With customary honour, who separates the fields with his sign. Terminus, whether a stone or a stump buried in the earth, You have been a god since ancient times. You are crowned from either side by two landowners […] Neighbours gather sincerely, and hold a feast. And sing your praises, sacred Terminus: You set bounds to peoples, cities, great kingdoms: Without you every field would be disputed". See the online English version at https://web.archive.org/web/20070310003929/http://www.tkline.freeserve.co.uk/Fasti-home.htm (accessed September 2024). See also the classical English translation edited by Frazer (1931).
31. Note that this is a difference both with reference to deontic artifacts and status artifacts. While this is obvious in the former case, it is interesting to highlight this point also in the latter. In the case of status artifacts, the direction-of-fit is similar to that of deontic

artifacts (a world-to-artifacts direction-of-fit): for instance, if a mourning dress is worn by A, this signals to B how to behave appropriately towards the wearer of this dress (but there is clearly nothing necessary or automatic in this).

32. Steering artifacts could also be called "nudging" artifacts; however, we prefer to avoid a label like this because the idea of nudging (also in the seminal work by Thaler & Sunstein, 2008) is too generic (Lorini & Moroni, 2022b).
33. See https://www.engineeringclicks.com/types-of-hammers/ (accessed May 2024). On the pre-history of hammers, see Coghlan (1945).

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