

What is a form? About the classification of archaeological pottery

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The main question we want to ask here concerns the application of philosophical considerations on identity about artifacts of a particular kind (pottery). The purpose is the recognition of types and their classification, which are two of the main objectives of archaeological investigation. These ceramic objects, because of their “simplicity” (to which we will return), also lend themselves to abstract considerations that may suggest a fruitful use of the mathematical rules of geometry. It is therefore not surprising that authentic mathematicians, such as George David Birkhoff, have been interested in this question of the characterization of forms (and especially of their complexity). But we will see how this way, which facilitates the best replicas of these objects (and from a certain point of view, the most “rigorous” descriptions), diverges from the comprehensive perspectives of the social sciences from which archaeology cannot escape. This divergence takes up in a way the opposition between the abstract and the concrete, for which we must however consider certain interrelations. But it is not really confused, as we shall see, with the two main philosophical approaches to objects: one considering them as elements of reality (ontology), and the other as entities targeted by acts of representation (semantics). Faced with an archaeological situation, and in the specific case of type recognition, this tension will generally be expressed in terms of uncertainty (epistemology). Finally, rather than imposing a very precise definition of the notion of “type” from the outset, we shall consider it initially as equivalent to that of “category” or “class”, and then risk an “onto-epistemo-semantic” proposal (Moulines 1994).

Artefact identity and classification

The question of identity is complex and can be broken down into three meanings when we limit ourselves to the apprehension of the identical (Wiggins 1980; Descombes 2013). Thus, we can recognize that there are objects in industrial productions that are almost indistinguishable. Certainly, they do not occupy, each one of them, the same spatio-temporal position, which makes it possible to count them (numerical identity). But, among those which are mobile or potentially mobile (*“le mobilier”*, so well

named in French), their study leads to some difficulties in processes of recognition: for example, is this beautiful plate that disappeared from a museum the same one as the one which one has just found at this thief's place? In this field, the professionals of these institutions have become accustomed to affixing a mark that is equivalent to identification and certification, a procedure that resembles the signature in other registers. Once they have left the factory, objects can also have small defects that differentiate them, but it is above all as a result of their use that particular stigmas appear and allow distinctions (qualitative identity). We all have specimens of tableware, even though they come from the same industrial factories, that we exclude for special occasions because they have chips that are considered "unsightly", which are therefore incidentally singled out. On a mesoscopic scale (Gibson 1979), this question of indistinguishability is less relevant in the majority of archaeological contexts studied (an archaeology of the industrial periods is however quite legitimate). We find productions that are never really identical, with however individuals that seem to be distributed around types of which one can "intuitively" spot certain variants (sortal identity). Obviously, this division into types applies even more easily to industrial productions, and all of them, whether they are inventive or stereotyped, are susceptible of a classification, automated or not.

Before we focus on the specificity of pottery, it is worth recalling a few general traits relating to ordinary objects or artifacts (Preston 2022). The questioning about the identical, namely "is it the same object?" can also be broken down under three headings (Lenclud 2007; Boissinot 2013). First, by considering the manner in which the object occupies space, including both its shape, dimensions, and material constituents. Unlike natural substances and organisms, it is uninformative to analyze an artifact that has been reduced to a powder or put into solution to better determine it. This is not how one recognizes a pencil or an amphora, their spatial configuration being as important as their microscopic nature. Secondly, an object is characterized by a functionality, i.e. by direct or indirect ways of acting through it and on it, which supposes the existence of an agent who recognizes it, whether he has made it himself or not (this can be other agents or natural things which have not been transformed). Third, an object is usually associated with a function assigned to it within a society as well as with a name. While its material can be qualified after the fact, while stigmata of functionality can be observed mainly on its surface, its function (arguably one of the most important aspects of its identity) requires *in vivo* observation and extrinsic considerations. The first two observations

require an etic approach, while the last one, related to function, is primarily based on emic considerations. The matter is even more complex when the function understood by the manufacturers differs from that of the users, for example when the objects cross socio-cultural frontiers, or when the opportunity or the circumstances seem to impose themselves. For example, I use as a bedside table what is sold in supermarkets as a stool, on which I never sit, even though I know it is designed for that purpose. These considerations lead to confusions about the difference between function and functionality, as one often finds in academic literature. François Sigaut, who had seen so many agricultural objects, and not only in contemporary contexts (where one can imagine a certain freedom of use, as in the example of my stool), summarized this with a subtle formula: “a knife is not used to cut, it is used by cutting” (Sigaut 1991).

The epistemic constraints of archaeology force us to be somewhat modest. Indeed, we must distinguish the deductions made from the configuration of the artifacts themselves and then from the aggregates in which these objects are discovered (Boissinot 2015), from possible information obtained from other documents (written or oral testimonies). It must then be admitted that the identity of the artifacts remains largely undetermined, despite an increasing recourse to laboratory observations and analyses, as well as to more and more ethnographic references. While it is clear that one cannot have done just anything with an object and that the existence of a field of possibilities (or impossibilities: a vase in the shape of a jug cannot be used to bake a pie!) is a valid hypothesis, the fact remains that the real function of artifacts is inaccessible in most cases.

The essential properties of (archaeological) pottery

What do we want to talk about here? The objectives of this study are twofold: 1) to designate a concrete category of artifact that has some consistency and 2) to examine how it leads us to more abstract questions that other objects do not generate. Although our reflections apply to these objects in general (and for example to industrial productions that we can find in catalogs and acquire), we limit ourselves here to archaeological situations, that is to say, by being deprived of any information other than that coming from the (material) things themselves. For the reasons we have given in this paper, the question of the function of these objects will not be addressed, nor that of their possible prior naming (but we are well aware that the problem of the lexicon cannot be avoided). It is in a way an attempt to “naturalize” the artifacts, although we know that the things in question do not belong to “nature”.

The category selected is that of “pottery”. The term seems to come from the French and certainly designates productions first shaped with plastic materials (clay, stoneware...), then generally fired. It is preferable to the term “ceramics” which refers to a broader category of objects, and includes building materials such as tiles, bricks or floor tiles, or statuary. The proximity to the term “pot” (though mostly referring to deep containers) is interesting in that we want to mention the functional relationship of container/content, usually indicated verbally by the preposition “in”, which is one of the most fundamental spatial relationships in many languages. We could say, to paraphrase a remark we quoted, that a “pot serves by containing”, whether it is liquids or solids, with the action of fire or not (obviously, other objects have these functionalities). According to Claude Vandeloise, who was a Belgian linguist influenced by cognition and working on spatial representation, the container/content relationship is understood less in terms of inclusion/exclusion (as developed in mathematics), than in consideration of the “forces” that the container exerts on the content (Vandeloise 1986). Taking up his distinction between target and site, respectively in this case, content and container, the linguist notes that the former “moves” towards the latter and that the latter “controls” the position of the former, not the other way around. Finally, depending on the concavity of the site (the container), it is sometimes the carrier/carried relationship that takes priority when it comes to describing these situations by verbal expressions, with, here, the preposition “on”.

The accessibility of the pottery’s contents is undoubtedly at the origin of the academic distinction between open and closed vessels, as understood, for example, by the French school of ethnography, a type of presentation that corresponds well to the search for fundamental oppositions as practiced in certain circles (Balfet *et al.* 2000). This intuitive (and primordial) difference has given rise to various arithmetical proposals based on the study of the proportions of the pottery, and in parallel, attempts to classify the forms. The simplest proposals define open vases as

“vessels that have their largest diameter at the opening. Closed vases, on the other hand, have an opening diameter much smaller than the maximum diameter. They often have a more or less wide neck” (Chertier 1976, p. 102).

Other more elaborate relationships have subsequently been considered for more complex forms (Dumas 2016), but it must be admitted that some vessels escape this dichotomy, such as the cylinder vases (species of tankards) that are known from both pre-Columbian South America and

protohistoric Europe (Boissinot 2022). For her part, Anna O. Shepard, the author of the first major work on ceramics for archaeologists (Shepard 1954), recognized three major categories by distinguishing between unrestricted, restricted or necked openings (fig. 1), which corresponds well to this idea of resistance to extraction, but which does not concern the entire vase.

In many societies, the container/content relationship is the subject of metaphorical developments in relation to the body, whether human or animal. This aspect concerns both the habitat and the pottery. For the latter, it is not so much the stories as the lexicon (lip, neck, throat, body, shoulder, foot...) and certain forms of decoration (in hollow or in relief, when it is not a question of handles compared to arms) that attest to certain analogies (fig. 2). It will be noted that the scientific literature has not completely abandoned these ways of naming which, like any description in natural language, encounters problems of definition and vagueness. Other attempts, which aim at more rigor and to which we will return, have sought new formulations, when it is not a global coding of the selected observations.

Unlike other artifacts, pottery is not an assembly of different parts (think of a bicycle or a boat), but a plastic montage where possible additions of material, for example for gripping elements, are finally "melted" into a clay mass. This description in terms of "fusion" could also be retained about various prefabricated parts which are finally assembled to obtain the whole (one generally recognizes them thanks to the preferential breaks which they show when the object is broken). But should these technical aspects, when they can really be demonstrated, be taken into account in an analytical approach of the form? And this, in the same way that we take into account the bony assembly, hardly visible when examining the body surface of a vertebrate, in order to distinguish (and thus, name) the different parts of the body? Concerning this "fusional" aspect, we must also point out certain consequences in terms of identity over time. Indeed, in the absence of a true assembly, this type of object cannot see some of its parts replaced without directly losing its identity; it is moreover difficult to replace parts, i.e. to compose an assembly which allows to preserve the integrity of the object. There are certainly repairs that are sometimes made, for example around a crack with a lead staple or using gold as in the Japanese *kintsugi*, or others that are less noticeable with glues that have not survived time. But, generally speaking, deteriorated pottery changes its functionality or is sent directly to the rubbish. This is not the case with flints that can be resharpened, metals that can be reheated or re-forged, or

boats that can be repaired by having all their parts gradually replaced. This winks to the famous ancient enigma of Theseus' boat, which paradoxically raises the question of the identity of artifacts over time (one object that can eventually become two: Ferret 1996), does not therefore concern our pottery, which is an object with "restricted" plasticity, operating a direct link between manufacture and use. For this reason also, we will be less inclined to consider a four-dimensional presentation of these ceramic objects, that is to say, to considerations of both three-dimensional space and time, as suggested by certain philosophical currents (Heller 1984; Sider 2001).

Another property that concerns the vast majority of these vessels is their cylindrical symmetry, which is almost systematic for modeled vases, and which will become even more important with the introduction of the potter's wheel technique. There are, of course, vases with square mouths, oval dishes or zoomorphic pottery which join our "other" categories and do not count for much in our attempts at systematic classification. This property of symmetry concerns the profile of the vase, whose knowledge is reduced to a profile, and finally, to a curve (with the possibility of angular parts), apart from the possible decoration or the means of gripping. Describing a type (or a category) is therefore the same as characterizing a curve, with the nuances that have just been recalled, which mathematicians know how to do in general, as we shall see. One will not forget either the facilities which are now offered for their representations, the archaeologists having taken the practice to publish typological plates (which are sometimes envisaged as an outcome of their research) where an axis separates the interior side from its exterior, with indications on the variations of thickness of the paste. Another field seems to have led to the same epistemic reductions, with equivalent benefits, that of modénature in architecture, which refers to the study of the ornamental treatment of a building. If the question of cylindrical symmetry applies to the columns, their bases and in part their capitals, the moldings that affect the cornices or podiums on the other hand are more a matter of translation. Whatever the case, the representation retained is the same, that of a curve whose hollows and reliefs can be followed.

Before discussing the question of treatment by curves, let us point out that there are other ways of constructing types (in the sense of particular configurations) which are not specific to pottery. They consist in the construction of a bundle of properties, the latter being retained in a finally indefinite list (the ways of conceiving or describing reality are not entirely determined) insofar as it seems to us that they are operative for our distinctions. And generally, when we proceed to an automated treatment of

these data, sometimes too numerous to be mastered by a single human mind, we have the satisfaction of seeing that the classifications obtained correspond well to our most intuitive approaches. Because they seem to aggregate in a separate way, we have the feeling to have identified these “plural particulars” that are for us the types (although one can also admit “singular particulars”, represented by a single exemplar). But particulars to which we would like to confer the status of universals, in the same way that language operates a displacement of certain proper names towards common names.

Measuring operations and mereology

Let us consider the geometric form of the sphere (which can be reduced to the equally pure curve of the circle). According to this mathematical approach, no line on the volume or point on the curve is singular, the center of the circle being moreover external to it. Let’s move on to concrete things: for billiard balls or ping-pong balls, except for a few paint details on the surface, it remains the same. As for our planet Earth, which is not exactly spherical, it has high and low points, parts that are emerged and others that are under water, so that we can concretely singularize many points, lines and surfaces. In Barry Smith’s terminology, these boundaries that we can observe are said to be “bona fide” in that they are authentic, true, and without interpretation (Smith 2001). In contrast, when we consider the longitudes and latitudes of the same planet, we do not see any lines on its surface and we know that they refer to a human decision for purposes of location and cartographic possibilities: these boundaries exist only by decree and are called “fiat”, even though they may also account for some properties in a relatively fuzzy way (e.g., different climates if one is towards the equator or around the tropics). It is quite likely that both fiat and bona fide delineations will be useful to us in describing our pottery, and we will clarify why this is so (and may follow representations that take this into account in the future, e.g., based on the graphical presentations of Vogt 2010, who works on biological entities).

If, from a sphere, you intend to make a container, you will consequently make a division into three parts (fig. 3): apart from the hole that allows access to its interior, there is the orifice that constitutes the rim area (because it is necessary to be able to access the interior), then the body itself (because it is necessary to be able to contain), and finally the bottom (because it is necessary to have a stable position). Without constituting a necessity, the two extreme parts are often the object of a more or less large distinctive treatment, which means that we are not always able to know

where they really begin, this being able to be done gradually. We have just seen the simplest case, that of the sphere (or circle), which is close to those of cylinders and cones, and to some extent to hyperboloids, ovoids or ellipsoids (which have particular points of constriction, or of greater width). However, these “pure” forms are not the only ones found in pottery production. Many of them could be considered as arrangements of various “pure” forms, or at least, of truncated parts of these forms. This results in a multiplication of parts, and undoubtedly the existence of sub-parts.

This way of considering parts in a whole belongs to a sub-discipline of ontology called mereology (and mereotopology when aiming at spatial questions: Varzi 1996). This type of approach known since antiquity has been mostly axiomatised and formalized since the work of the Polish Stanisław Leśniewski (1916-1992) and is used nowadays to ask many metaphysical questions about material objects (Goodmann 1951; Simons 1987; Casati, Varzi 1999). This theoretical approach is complementary to set theory and differs from it in, among other things, the absence of the null (or empty) element as well as an apparent resolution of the “class paradox” as pointed out by Bertrand Russell. Among the relations of parts to a whole, which are transitive and antisymmetric whatever the formalism used, there is the notion of overlap (and its opposite: disjunction) which is used when two objects (or two parts) have a part (or subpart) in common. This concept can be useful when one is for example faced with an uncertainty in the determination of parts, when one does not really know when one begins and the other ends. Pots can be considered as sums of parts that can be considered either as disjunctive or by admitting the overlapping relation (which amounts in this case to the recognition of fiat limits). We begin with the first option, which has met with some success in ceramology.

We owe to a true mathematician the first rigorous analysis of ceramic profiles. A specialist in the theory of numbers and the analysis of dynamic systems, George David Birkhoff (1884-1944) was also interested in the question of measurement, applying it in particular to human creations that involve “a free expression of aesthetic ideals”. It is in his work *Aesthetic Measure* (1933), after considerations on ornaments, that he develops a reflection on the vases, by privileging the aesthetic attraction which they produce, thus bringing itself back to aspects likely to be immediately seized by the eye. It is therefore the “visual contour” (rather than the cross section) that he analyzes, by identifying characteristic points (with the corresponding tangents at these points) in figures composed of geometric

curves much simpler than those found in ornaments. He proposes to classify them into four categories (fig. 4):

“(1) the points of the contour line where the tangent is vertical; (2) the points of inflection where the curvature changes direction from concave to convex; (3) the end points of the contour; (4) the corner points where the direction of the tangent changes abruptly” (Birkhoff 1933, 69).

It follows, according to the number of these points and their distribution along vertical and horizontal axes, various considerations on the complexity of the vases and their “harmony”, as suggested by the introduction to this work, which recalls the Renaissance research on the proportions of the human body. One will notice moreover (and retrospectively) that this spatial consideration of tangents is not without links with the process of construction of curves in the vector drawing software that we use precisely to represent potteries (and so many other things, like car bodies in the context of the work of Pierre Bézier who gave his name to their posterity).

This geometric perspective was taken up by Anna O. Shepard (1903-1971) in her very comprehensive manual on archaeological ceramics (Shepard 1956). If certain points concerning technology or material analysis, or even statistical approaches are partly outdated (this was the time when the first punched cards appeared, aiming at a “proto-computer”), her reflection on forms still retains all its interest today. Once the characteristic points have been recognized (as defined by Birkhoff), properties of symmetry, structure, type of contour, geometric shapes and proportions are considered in this order in order to proceed to a classification, and this, independently of functional considerations. In order to justify this abstraction, the author points out that “vessels are sometimes used for purpose for which they are not well suited by form” (Shepard 1956, 228); and she reminds us several times how unsatisfactory the commonly used names are. We can only agree with the ceramologist in this respect when we see the use of different names, from one specialist to another, for profiles that seem similar overall. Dictionaries, which are places for recording usage, but also attempts to regulate the lexicon, are not always very helpful. We have seen this in connection with the definition of “*coupe*” (cup) in French (Boissinot 2022, 92-93). Most of the words in ordinary language are indeed synthetic concepts that combine criteria of various kinds and account for assemblages already exemplified as such, while offering the possibility of metaphorical or metonymic displacements (thus, the term “cup” is often used as a synonym for “open vase”). These terms are

also borrowed from a certain vagueness because of the indeterminacy of our semantic categories and the imperfection of our discriminative faculties (Williamson 1994; Keefe 2002; Egré 2018). From “*coupe*” to “*bol*” (bowl) or “*jatte*” (basin) for example, yet recognized by all, how many intermediate models do we see? We are here under the regime of “family resemblances” pointed out by Ludwig Wittgenstein and we will have to content ourselves with proposing various frequencies of attributes rather than necessary and sufficient conditions. But, from the ordinary to the scientific, the temptation is great for a more stipulative and coherent definition, following the example of what is practiced in mathematics and experimental sciences. It will be necessary, however, in this case, equipped with our own definition of the category in question (what is a “cup” for example), to negotiate it with the other members of the scientific collectives, whether they are of the present, the past or the future. Experience shows that this generally remains a pious hope and that we must count on a plurality of meanings, probably because the act of definition is not neutral and we import our points of view into it, under aspects that seemed to us exclusively descriptive.

In her work of “abstraction”, although it is intended to analyze each of the concrete cases, Anna O. Shepard is not fooled by the “violence” she does to social reality:

“[...] potters were not constrained by mathematical specifications. Furthermore the very plasticity of clay tempted them to vary shape and to originate new forms” (Shepard 1956, 232-233).

This leads us to three reflections on necessary references to the intentions of the potters:

- first, to admit that the famous “characteristic points” are certainly not the only ones (if indeed they were) to have been taken into account by the makers, as can be indicated, for example, by decorated bands disconnected from vertical tangency points, or areas with different finishes depending on the intended use of the container (which means that the number of potential parts considered was greater than that retained by the mathematical analysis and, for the closest of them, they may not have had the value they are given);
- then, to take into account a dynamic vision of the types, even if we stick to the only formal characters: concerning the cases known as “intermediate”, we remain sometimes in the uncertainty as for what

corresponds to a widening of the neck, to an excrescence of the edge, to the realization of facets for a shoulder (this leads us sometimes to place as variant of a given type that which could come from another type);

- finally, to realize that treating the form in a *sui generis* manner prevents us from seeing in these vessels transpositions of other containers in various materials (wood, calabash, wicker, metal...).

These comments, although they concern the form of the pottery, are aimed precisely at what Anna O. Shepard rigorously attempted to remove from her classification essay. However, as she points out, there is an order in her choice of formal criteria (proportions come after types of contour, for example), and thus, obviously, a hint of subjectivity. Thus, if we follow her hierarchical logic, we would have to think that whether a vase is high or low form (some have tried one-dimensional numerical criteria on this: Dumas 2016) matters after we consider its profile.

This question of the hierarchy of criteria is fundamental as soon as we want to go beyond the simple question of the replication of forms. In more recent analytical approaches, one can observe some biases with regard to the hierarchy of the parts of the profile, leading to the construction of types that one wishes either to bring together or, on the contrary, to distance, undoubtedly because of perfectly valid intuitions (but which are then adorned with the virtues of a systemic approach). We give in [fig. 5](#) the example of a classification that crosses the forms of the body with information concerning the neck of the vases, and secondarily the bases of these vessels. Now, the "families" distinguished (and subsequently compared) are indeed based on the "elementary forms" of pans (A to L), about which, and particularly the one called C, one can question their elementary character. In this particular case, one may wonder if the upper part is not a neck in some sense (above a basin), and one will appreciate that the authors, in affirming their choice, have deduced the logical impossibility of having a low or high neck. However, is it necessary to distance them so much from the specimens appearing in the lower right quarter of the table? With a "dynamic" look, is it not possible to pass from certain forms to others by simply widening or stretching certain specimens, until transforming a carina into a shoulder?

Point of view from nowhere, universals and culturalism

The reality is always more populated than the lexicon. We can see this for the colors that we have difficulty naming in ordinary language, which are however perfectly defined (and ordered) thanks to their wavelength. But it is not with this type of variable that one speaks to oneself, nor even that one undertakes to repaint one's walls, by giving oneself good reasons moreover. However, in the very particular register of techno-science, and in order to progress even more in this same field, one admits without hesitation that this approach by the wavelength is perfectly useful and rigorous. With a few nuances, it is almost the same for the definition of the types of pottery, for which one would however have great difficulty in finding a variable to order them along a single axis. Even if we resort to multidimensional analyses starting from a coding of the finest observations and by sharpening as well as possible all the elements of the lexicon, we risk to elaborate a complex formula, but which will not be a usual name, undoubtedly useful for computer treatments (and incidentally for a numerical duplication of the specimens), valid as well in Singapore as in Berlin, and even for a non-human intelligence to which we would deliver the code. This "point of view from nowhere" is likely to be of little use to anyone who undertakes an effort to understand human productions, which is, however, the epistemological project of the human and social sciences to which archaeology belongs. It will therefore be necessary to make attempts to adjust between the etic and emic points of view, if they are indeed possible.

In asking "what is a form?" we have evoked questions of identity that come back to the question "how can we be sure that two objects that are not strictly identical belong to the same form?" Birkhoff's analytical procedure, one of the most rigorous proposals in this register and a beautiful mereological construction, finally comes up against, as we have seen, the vagueness of the lexicon that one will finally have to use in order to get out of a codified description and produce historical inferences. The usual words to say the parts are not indeed perfectly analytical concepts (but, however, to a lesser extent than the synthetic notions designating the wholes that are our objects). Moreover, the parts themselves do not have totally assured limits, so that one recognizes some of them as fiat and others as bona fide, when one is not forced to consider overlaps between them (no doubt this is due to the plasticity of the ceramic). Finally, as we have suggested, functional and dynamic aspects seem to orient our ways of

saying forms and, by abstraction, of conceiving types, even if it seemed to us that we were only talking about parts in geometric space. It would be a question, in a way, of a “contamination” of the ontological by the semantic, which undoubtedly constitutes a specificity of these objects that are the artifacts, sometimes declassified by contemporary metaphysicians like Peter van Inwagen (1990).

When one has to analyze a collection of pottery coming from a singular archaeological context, the distribution of these objects is first done in an intuitive way on syncretic criteria of resemblance. The recurrence of observed traits helps in the formulation of types, even if some of the specimens do not seem to be entirely similar. One can then dispense with a very fine description and propose a list, without giving much importance to their denomination in ordinary language (or even with a relatively specialized lexicon): this context will thus present types 1 to n, or A to Z, and will thus be considered as typical of a time and a place (culturalist perspective). It becomes imperative to resort to more analytical descriptions as soon as a comparison is projected, either with distant contexts or with others that are not contemporary. For it is a safe bet that the lists to be compared will not be the same, and that the types from one context to another are not so easily translated. We will say, for example, that here the type X presents a form that is more rounded or more angular than that of the type X' there, which however belongs to the same “idea”; or else, that it has no correspondent (i.e. another type that belongs to the same “idea”) elsewhere. In other words, it will be necessary for us to have some universals at our disposal in order to make this comparison, and finally to give up a too abrupt distinction between abstraction and concreteness. The great philosopher of phenomenology, Edmund Husserl, who was interested in morphological idealities, not with regard to the compact or angular character, but with regard to the roundness, had referred precisely to the aim of the potters, the most concrete of them (Husserl 1984).

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Figures

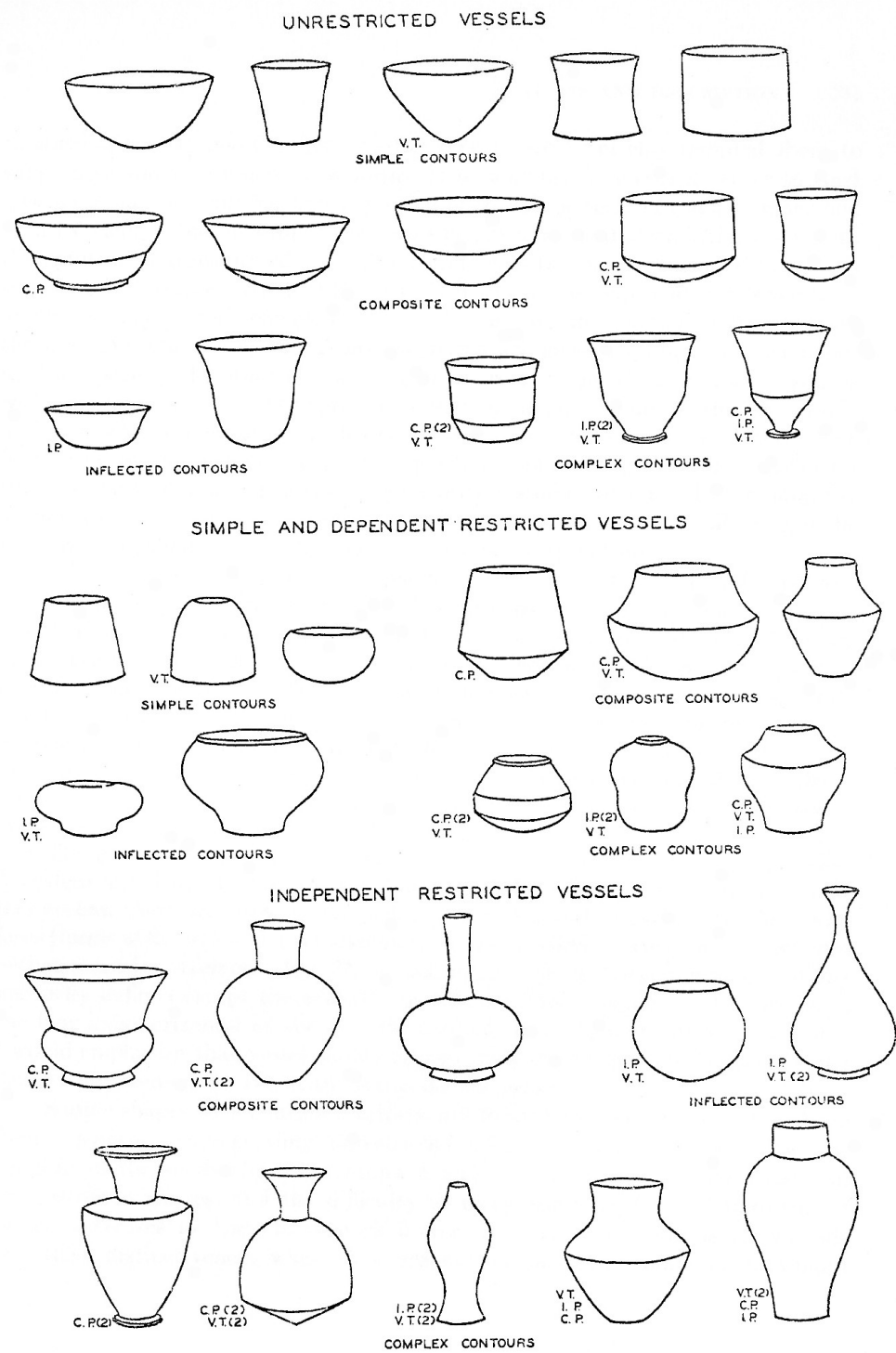


Fig. 1: general system of shape classification after Shepard 1956 (p. 231).

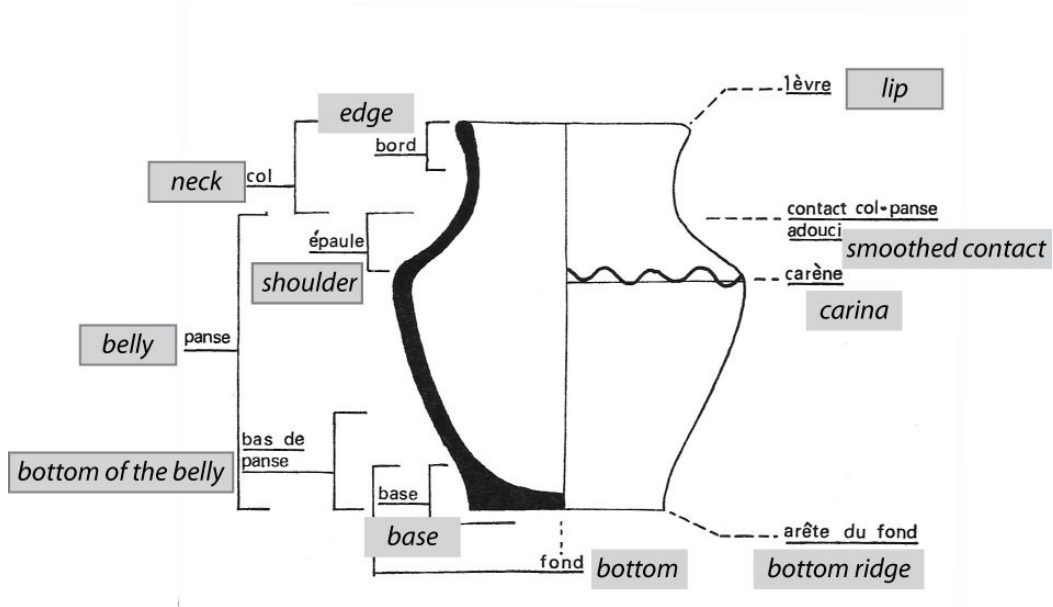


Fig. 2: the naming of the parts of a restricted Iron Age vase in southern France according to Py and Dedet 1975 (with translation).

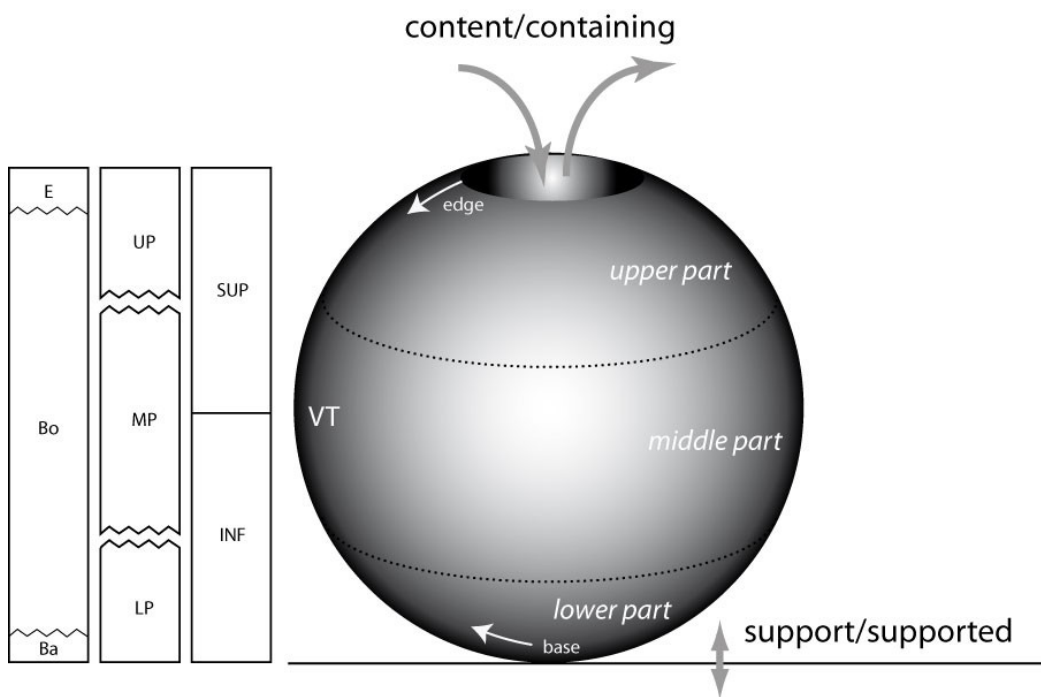


Fig. 3: the passage from an abstract to a concrete object, with the example of the sphere. On the left, the different parts that can be retained, with the broken lines (after Vogt 2010) indicating the gradual (and therefore uncertain) limits or those postulated by the analysts. VT: vertical tangent.

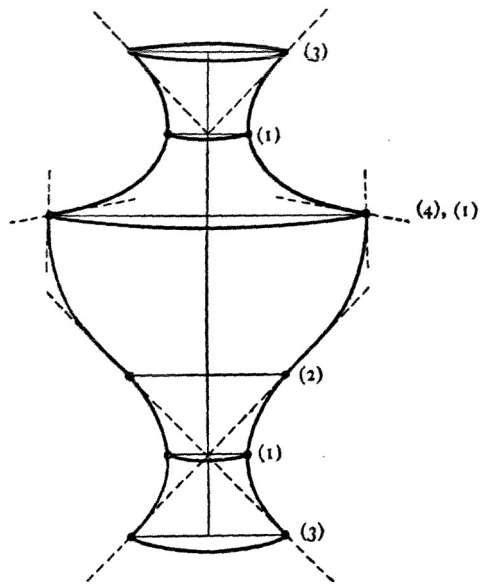


FIGURE 12

Fig. 4: the essential points of a ceramic profile according to Birkhoff 1933.





















































Col et fond Panse	Absence de col : 0					Col bas : 1					Col haut : 2		
	f.rond : a 0a	f.ombiliqué : b 0b	f.plat : c 0c	pied bas : d 0d	pied haut : e 0e	f.rond : a 1a	f.ombiliqué : b 1b	f.plat : c 1c	pied bas : d 1d	pied haut : e 1e	f.plat : c 2c	pied bas : d 2d	pied haut : e 2e
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Fig. 5: an attempt to classify the ceramic types of the protohistoric necropolis of Gourjade (France) according to Giraud *et al.* 2003. Lines: types of bodies; columns: types of necks and, secondary, types of bases.