Introduction
The materiality of things has always received special attention in Classical archaeology. During the last two decades, however, this aspect of things, combined with a new interest in media, has become a focal point in all of the humanities, captured by the catchphrase the ‘material turn’. This has led to a new and more specific form of attention to material phenomena, which focuses upon the physicality of human beings, their relationship to the materially ‘arranged’ space, and, in this connection, also examines the overarching ‘thingness’ of the world in which they live. In recourse to phenomenological approaches, especially that of Martin Heidegger, material substantiality and the ‘object character’ of our environment has moved into the foreground of humanistic, cultural and social scholarship. In this research tradition, it is recognised that things resist a one-dimensional, functional appropriation. These insights into the ‘power’ of things inspire material culture studies to examine their biographies, their ‘social life’, and their psychosocial and economic relevance. No less important, this intensive tendency towards ‘thingness’ is also a reaction to recent social developments: on the one hand, the current social discourse is confronted with a rapidly advancing digitalisation and the accompanying dematerialisation of our life-worlds, and on the other hand, it is equally confronted by a flood of material objects (products, goods and commodities).
Our starting point for this colloquium, however, is not the material culture or the artefact as such10, but a specific quality of things, namely their material11. This approach shifts the focus onto the cultural effects of these materials; onto their aesthetics, semantics and functions. Although these aspects of the topic are the subject of countless individual studies and are universally present in both material culture studies12 and in the artisanal-creative disciplines13, a systematic conceptualisation is still lacking. In the following discussion the aesthetics, semantics and functions of materials will be considered first against a theoretical background, and then from an ancient perspective14.

Aesthetics of Materials

Considerations of material aesthetics lie in the realm of general reflections on aesthetics, since such reflections have always paid attention to the (material) appearance of things. The early theories of aesthetics from the 18th century were particularly interested in the relationship between aesthetics and knowledge. For Alexander Gottlieb Baumgarten (1750), scholarly thought aimed for a clear and comprehensible knowledge, while sensory knowledge was a kind of cognitio confusa. However, Immanuel Kant did not follow Baumgarten’s notion of aesthetics as a form of knowledge. According to Kant, aesthetic intuition was concerned neither with insights and concepts, nor with any practical purpose, but rather with perception15. Kant’s transcendental aesthetics privileged the unadulterated intuition pre-existing in its pure form within a person’s mind, as opposed to the sensations corresponding to the appearance yielded in turn by matter or physical substance16. In the following period, this notion opened up the way for a striving towards the conquest of materials in favour of form17. Only in the recent past have we accomplished an ‘aesthetic renewal’ that understands aesthetics as both experience and appearance18. According to Martin Seel, this is accompanied by a

10 The word ‘artefact’ denotes something that is artificially made. In the various disciplines of archaeology and ethnology, there is a differentiation between man-made artefacts (e. g., a spear) and naturally occurring things (e.g., a branch). Generally, everything that humans create, both material and immaterial, is subsumed under the term ‘artefact’ (Eggert 2014, 169). Each discipline adopts a somewhat different definition of the term. For an introduction, see Eggert 2014, 169–173; Tsouparapoulou – Meier 2015, 47–61.
11 See Ingold 2007; Meier et al. 2015, 19–31; Stockhammer 2015, 26. See also Seel 2003, 173: ‘Material steht dabei nicht für Materie, sondern für das, was bearbeitet bzw. womit gearbeitet werden muß [sic], damit von Kunst einer bestimmten Gattung die Rede sein kann.’ (Here, ‘material’ does not stand for ‘matter’, but rather for that which must be processed or worked with so that we can speak of a particular genre of art). On physical presence, see Thomas 2005, 15: ‘Die Materialität korreliert also mit der von uns wahrgenommen, physischen Präsenz des Objekts, die Substanz mit der physikalischen Beschaffenheit der Bestandteile des Objekts’ (The materiality correlates with the physical presence of the object as we perceive it, and the substance with the physical qualities of the parts of that object).
12 In Hahn (2005) we find (albeit with a different focus) similar categories, while Hartmann and Haubl (2000, 9 f.) look at the quality of things in their function (‘technical aspect’), aesthetics (‘aesthetic aspect’) and semantics (‘cultural and social aspects’) in a short summary text.
13 Heufler speaks of ‘practical functions’ (Heufler 2016, 27–32), ‘aesthetic functions’ (Heufler 2016, 37–43) and ‘product semantics’ (Heufler 2016, 44–58) in design; see also Hirdina 2010, 41. 62; Steinbrenner 2010, 12 f. 18; Bürdek 2015, 11–14.
14 For aesthetics, semantics and function in object design of Roman small finds, see Hierscher, forthcoming.
15 On this culmination in Kant, see Seel 2003, 18.
16 Kant [1790] 1954, 63–65; von Kutschera 1988, 100 f.; Wagner 2005, 872 f. In the aesthetics of Georg Wilhelm Friedr ich Hegel, painting still claimed the highest place amongst all the fine arts, on the basis of its capacity for abstraction and independence from materials. Nevertheless, because all the fine arts are dependent upon sensorial/physical matter, Hegel valued them less highly than music or poetry. Only when all material was stripped away could true art emerge, see Hegel 1979, 123 f. 936.
tendency towards the medial quality of materials: ‘The outline of certain categories is first revealed through types of uses for the “basal” material. In this way we can define the fundamental operation of architecture as the division of space, the establishment of interior/exterior differentiation; [...] a fundamental operation of painting ought to lie in the production of differences between the picture surface and the picture’s appearance [...]’. These differences, that are created by a specific use of the basal material, can be understood as the primary medium of an artistic composition’\(^{19}\).

At the same time, this kind of consideration should draw our gaze to the sensuality of the material (meaning its aesthetic effects and presence), since media possess a sensorial quality per se\(^{20}\). The insights theoretically formulated by Seel were already an important source of inspiration for artistic practice during the course of the 20\(^{th}\) century. This new interest in materials correlates with the tendency towards abstraction and a focus on the technical and material contingencies of art, while also abandoning reproductive imitation\(^{21}\). Artists highlighted the theme of material aesthetics from many different angles. They addressed colour as material (as in the work of Jackson Pollock, for example), temporality as material (in the Fluxus movement), as well as the material’s synaesthetic qualities\(^{22}\) and its plasticity\(^{23}\).

However, these general considerations can be specified with regard to two aspects. First, materials do not possess a single aesthetic quality, but rather a variety of aesthetic potentials. In this sense, one might speak of a ‘polyaesthetic cloud’\(^{24}\). This leads to the second important aspect: it is only through the artistic treatment of a material that certain aesthetic qualities are visually privileged or made visible. In the case of alloys or ceramics, this applies to the production of the ‘artificial’ material per se, but in a large number of cases the aesthetic effects are created by a specific surface treatment of the material, such as polishing or coating. As a consequence, when materials are used for the production of artefacts (including architecture), this necessarily includes an artistic treatment of the material which affects heavily its aesthetic appearance.

**Semantics of Materials**

Material culture is understood in more recent scholarship as both a medium for discourse and a carrier of meanings. With this tendency towards mediality, a particular focus upon the materiality of communication\(^{25}\) and the semantics of materials also appears. Seel formulates this from a philosophical perspective in the following way: ‘In historical, cultural and foremost in special artistic contexts, certain materials always have a more or less determined significance or symbolism’\(^{26}\). In art history this provides the impetus for considerations of material iconography and material iconology\(^{27}\).

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19 Seel 2003, 174 f.: ‘Die Kontur bestimmter Gattungen ergibt sich erst durch Arten der Verwendung der „basalen“ Materialien. So könnte die grundlegende Operation der Architektur als „Raumteilung“ bestimmt werden, als eine Einrichtung von Innen/Außen-Differenzen; [...] eine basale Operation der Malerei dürfte in der Herstellung einer Differenz von Bildfläche und Bilderscheinung liegen [...]. Diese Differenzen, die aus einer spezifischen Verwendung eines basalen Materials entstehen, können als das primäre Medium einer künstlerischen Gestaltung verstanden werden.’
20 With respect to painting, see Gumbrecht 2004. On materiality and art, see Kleinschmidt 2012, 40–42.
21 On materiality and presence, see Gumbrecht 2004. On materiality and art, see Kleinschmidt 2012, 40–42.
22 On different aspects, see Wagner 2001.
23 Rohde 2015, 130.
24 See the contribution by Reinhardt, this volume.
26 Seel 2003, 174: ‘Im historischen, kulturellen und erst recht im speziellen künstlerischen Kontext haben bestimmte Materialien immer schon eine mehr oder weniger festliegende Signifikanz oder Symbolik’.
On a (pre)iconographic level we find the sensorially palpable qualities of the material. These physical characteristics provide a frame of reference for attributing meaning – for example, the hardness and resilience of stone, or the warmth of wood. This semantic reference, which may be understood in a semiotic sense as an ‘indexical’ reference, is, however, ambiguous. In this sense we may speak of a polyvalence/polysemanticism of the material\(^{28}\). It is then the (historically specific) usage of a material\(^{29}\), as well as its spatial, social and cultural context\(^{30}\), which provides a more specific attribution of meaning. Iconology thus opens up the possible symbolic references of materials\(^{31}\), as well as the meanings of the objects in question (product languages\(^{32}\)). This is exemplified by various semantic relationships: lead is heavy and so awakens the related associations that fan out into various culturally-specific discourses\(^{33}\). Bronze is weatherproof, and during the medieval period it not only signified endurance but was also understood as a reference to tradition and antiquity\(^{34}\). Under National Socialism durable materials represented the aspiring endurance of the Third Reich\(^{35}\), while the arte povera of the post-war period intentionally distinguished itself from this trend with the use of ‘simple’ materials\(^{36}\).

**Functions of Materials**

Heidegger, in his definition of ‘thing quality’, identifies two determined aspects of things: (1) they serve particular purposes and (2) in being used, they prove themselves reliable\(^{37}\). These aspects are applicable to materials, as well. The function of materials is often thematised in design- and architectural theory. Indeed, the first such considerations date from antiquity (see below). The Industrial Revolution brought not only new methods of production, but also a many new synthetic materials, which led to a new theorising of material science\(^{38}\).

Under the catchphrase ‘truth to material’\(^{39}\), which refers to a design and handling appropriate to the raw material\(^{40}\), different uses of materials were ideologically justified. The main issue at the centre of this discourse was the rejection of industrial-capitalist practices and techniques that imitated costly materials. There was no a priori opposition to individual materials or surface treatments. For John Ruskin and the Arts and Craft movement\(^{41}\), imitating materials, creating artificial

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\(^{28}\) See Wagner, this volume.

\(^{29}\) Plastic is exemplary of this: see Rohde 2015. On plastic as a sign of consumption, see Hahn 2015b, 42.

\(^{30}\) On the value of material objects from a diachronic perspective, see Bokern et al. 2015; Picht et al. 2015.


\(^{32}\) The theory of product language was developed during the 1980s by Groß (1983) at the Hochschule für Gestaltung Offenbach (thus, it was later called the ‘Offenbacher Ansatz’); see Steffen 2000, 6–8; Schwer 2014, 12–17; Heufler 2016, 33–35; Reinhardt 2018, 7 f. For a focus on the polyvalence of product language, see Schwer 2014.

\(^{33}\) In Ovid’s tale of Apollo and Daphne (Ov. Met. 1, 452–567), for example, lead symbolises sadness and loss. Here, Amor fires two arrows at the pair, one of gold and one of lead. Apollo, hit by the golden arrow, is overcome with love for Daphne, while she, struck by the lead arrow, responds only with aversion and disgust. In modern visual and performing arts, lead was used as both a metaphor and a medium. Both evoke various meanings. Lead is always heavy; it pulls one to the floor, and is the opposite of vitality and liveliness. ‘Leaden times’ are difficult, melancholic or gloomy. In the context of alchemy and mysticism, lead is also associated with protection, prophecy and transformation. On this, see Wagner et al. 2010, 41–43; Macho 2015, 199–206.

\(^{34}\) Since large-scale bronzes served as symbols of power and authority, bronze was ascribed the attributes of value and durability from the Carolingian period: see Gramaccini 1987, 147–180.

\(^{35}\) Fuhrmeister 2001.

\(^{36}\) Blaschke 2005, 50.

\(^{37}\) Heidegger 1952, 16–23.


\(^{39}\) On the development of the term the ‘truth to material’ (Materialgerechtigkeit), see Rottau 2012, esp. 3.


surfaces by painting or lacquering, distorting static structures and using mass-produced ornaments were all to be avoided\(^{42}\). Only the material itself, with its aesthetic and functional qualities, was to be made visible.

A somewhat different view of ‘truth to material’ is represented by Horatio Greenough (1852), Louis Sullivan (1896) and Gottfried Semper (1860). Greenough and Sullivan formulated the maxim ‘form (ever) follows function’\(^{43}\), which led Semper to a functionalist understanding of materials – here we might say that ‘material follows function’. In 19\(^{th}\) century Germany, this principle of ‘Materialgerechtigkeit’ refers especially to the appropriate and correct processing of materials. For Semper, architectonic forms\(^{44}\) were the ‘result of the material service or usage intended’\(^{45}\), and the ‘result of the substances used during production, as well as of tools and procedures that come into use during that process’\(^{46}\). The choice of materials is determined by a complex network of intended use, availability and their specific characteristics\(^{47}\). This fundamental idea was carried on in Bauhaus design theory\(^{48}\): here, the material was subject to the maxims of practicality, integrity and austerity\(^{49}\).

Both interpretations of ‘truth to material’ persist to the present day. The aim of construction-material science is to develop functional and appropriate materials for specific purposes and

\(^{42}\) Posener 1964; Kruft 1994, 331–335; 2004, 381.

\(^{43}\) Sullivan 1896, 408: ‘Whether it be the sweeping eagle in his flight, or the open apple blossom, the toiling workhorse, the blithe swan, the branching oak, the winding stream at its base, the drifting clouds, over all the coursing, “form ever follows function”, and this is the law’.

\(^{44}\) At the centre of Semper’s (aesthetic) theory of styles stands the beauty of form. This is not, however, considered to be something transcendental, but rather a ‘product or result’ (Produkt oder Resultat). Since the ‘elements of the form are not the form itself’ (Bestandtheile der Form, die nicht selbst Form sind), Semper viewed ‘ideas, energy, raw matter and resources’ (Idee, Kraft, Stoff und Mittel) as ‘pre-elements and basic requirements’ (Vorbestandtheile und Grundbedingungen): see Semper 1860, 7.

\(^{45}\) Semper 1860, 8: ‘Resultat des materiellen Dienstes oder Gebrauches, der bezweckt wird’.

\(^{46}\) Semper 1860, 8: ‘Resultat des Stoffes, der bei der Production benutzt wird, sowie der Werkzeuge und Proceduren, die dabei in Anwendung kommen’. For this reason, Semper also later (1860, 9–12) considered the construction and artisanal arts with reference to the qualities of materials. For him, the core task of textile art, ceramic art, tectonics and stereotomy was to render the raw materials useful for specific purposes, through labour and technical processes: see Mareis 2015, 250 f.

\(^{47}\) Quitsch 1962, 59; Reinhardt 2018, 22f.


\(^{49}\) Gropius 1923, 9: ‘Die Kunst des Bauens versank in den letzten Generationen in einer schwäblich sentimental, ästhetisch-dekorativen Auffassung, die ihr Ziel in formalistischer Verwendung von Motiven, Ornamenten und Profile erblieke, die den Baukörper bedeckten. Der Bau wurde ein Träger äußerlicher, toter Schmuckformen, anstatt ein lebendiger Organismus zu sein. [...] Der Architekt blieb im akademischen Ästhetentum hängen, ward müde und konventionsbefangen, und die Gestaltung der Städte entglitt ihm. Dieses Bauen lehnen wir ab. Wir wollen den klaren organischen Bauleib schaffen, nackt und strahlend aus innerem Gesetz heraus ohne Lügen und Verspieltheiten, [...] der seinen Sinn und Zweck aus sich selbst heraus durch die Spannung seiner Baumassen zueinander funktionell verdeutlicht und alles Entbehrliche abstößt, das die absolute Gestalt des Baues verschleiert. Mit zunehmender Festigkeit und Dichtigkeit der modernen Baustoffe (Eisen, Beton und Glas) und mit wachsender Kühnheit neuer schwebender Konstruktionen wandelt sich das Gefühl der Schwere, das die alte Bauform entscheidend bestimmte. Eine neue Statik der Horizontalen, die das Schwergewicht ausgleichend aufzuheben strebt, beginnt sich zu entwickeln.’ (The art of construction has sunk in recent generations into a weak, sentimental, aesthetic-decorative notion that finds its highest aim in the formalist usage of motifs, ornaments and profiles that cover the body of the building. The building has become a carrier for superficial, dead decorative forms, instead of a living organism. [...] The architect remains stuck in academic aesthetics, grows tired and trapped by conventions, and the composition of the city escapes him. We reject this building. We want to create the clear organic body of the building, naked and radiant, based on inner laws without lies or frivolity, [...] that functionally indicates its sense and purpose in and of itself through the tension between its constructed masses, and sheds everything fragile that veils the absolute composition of the building. With the increased strength and density of modern construction materials (iron, concrete and glass), and with the growing boldness of the new types of suspended construction, this feeling of heaviness that defined the old buildings will be transformed. A new static of the horizontal that strives to balance and lift the heavy weight is beginning to develop).
bring these materials into use – in the recent past with an eye on the environmental sustainability of the product, as well50.

However, ‘truth to material’, which is dazzling in itself and anchored in the 19th century context of its creation, is actually based on two problematic and interrelated notions. First, it assumes that a material is suitable for a specific use, that it is monofunctional, so to speak. In a second step, it elevates this functional use to an ideological maxim. Consequently ‘truth to material’ is not suitable as a hermeneutic description of a material’s function in relation to architecture and objects. Rather, materials can be used in various ways and with various aims. Thus, we may not only speak of polyaesthetics and polysemantics, but also of a polyfunctionality. The actual use of a material may rely upon specific physical qualities, but may also counteract other properties in a more or less intentional manner.

Material and Object

Up to this point, material has been viewed as a category in its own right. Nonetheless, the long-standing primacy of form51 should in no way be replaced by the primacy of materials52. This focus has only been taken initially, in order to analyse the potential of materials as clearly as possible.

In any case, material only exists in concrete forms. The aesthetics, semantics and functions of a given material therefore only reveal themselves in relation to a specific object. This is of course the case for things that have not been culturally appropriated or transformed, but applies specifically to designed artefacts, the topic under discussion here. Materials and objects can not only mutually enhance their aesthetics, semantics and functions (in the sense of a materiality that is appropriate to the object), but can also contradict and question one another53.

The aesthetics of materials can emphasise the object’s form, meaning and function in the most optimal way: colour gradients, patterns or surface textures, for instance, are all particularly effective in accentuating and highlighting formal qualities. The round form of a table top made from the cross-section of a tree trunk is supported by the concentric age-circles appearing in the timber. In contrast, a visually prominent material will dominate the form and confuse its line. Pavonazzetto and other heavily veined types of stone make it difficult for the viewer to observe and appreciate the play of finer forms in a sculpture. A particularly strong tension arises between material and form when the object’s surface and its core structure are produced in different materials: for example, when architecture is plastered or panelled, or when objects are coated in gold or silver. In this case, there is a differentiation between the ‘form-determining’ material and the aesthetically effective material applied to the object’s surface.

The semantic spectrum of meaning for materials unfolds particularly in relation to the object, which that meaning influences or even creates. In the case of a statue sculpted from coloured marble, the marbling may imitate the fabric of clothing or drapery. In particular, cultural connotations first arise from stable material-object form correlations. It is therefore also possible to play with (and even break) certain cultural norms and expectations: for example, by introducing luxury materials into contexts where they do not seem to be appropriate.

51 The notion that material is secondary to form has dominated Western thought for a long time, and must be overcome: see Wagner 2005, 867; 2008, 4–6; Strässle 2013, 8 f.; Meier et al. 2015, 23–26.
52 In more recent times a material-oriented approach has emerged as competition for the product-oriented approach in both design and architecture. This new approach sees materials as the starting point for the design process and tries to break down the traditional use contexts for particular materials: see Pahl – Weber 2008; Holzbach – Bertsch 2014; Holzbach 2014; Reinhardt 2018.
53 On material as a decorative quality of objects equivalent to form, ornament and image, see Hielscher, forthcoming.
Material and **object function** can mutually reinforce one another. Stable building materials lend the whole building stability. Nonetheless, various qualities considered desirable for an object can also end up in competition with one another. Glass vessels are considered ideal for tableware and for the storage of food on the basis of their neutral scent and taste, but they are nonetheless more fragile than vessels made from harder materials\(^{54}\). When the aesthetics of an object becomes its actual function, as is the case with show pieces, its practical use can be made difficult or even impossible. By combining various materials in a single object, the specific qualities of certain materials can be employed in a targeted way. Thus, wooden furniture gains greater stability through the addition of metal feet, whereas metal tools are made easier to use through the addition of wooden or bone grips.

These various examples not only make it clear that material and form enter into interaction with one another in terms of aesthetics, semantics and function; it is also apparent that the aesthetic, semantic and functional qualities generally cannot be played off against each other. The combination of different materials can perhaps have a functional motive, but it simultaneously has an aesthetic effect and invokes specific semantic associations. These material-form interrelations refer to a broad range of potential effects, of which only a few will be mentioned here. Plastering a wall, for example, protects the building material against the elements but it creates simultaneously a new aesthetic surface quality\(^{55}\), while silver inlays of bronze vessels have not only the effect of polychromy but also communicate the higher economic value of the object.

**Materiality in Antiquity: the *Naturalis historia* of Pliny the Elder**

Against the backdrop of these modern and postmodern theoretical discussions, we will now turn to an ancient perspective on the topic. Although a coherent theory of materiality was not developed during antiquity, ancient literature is rife with commentary on particular materials and their social value. The elder Pliny is a particularly prominent author in this regard; he refers not only to contemporary thought during the Imperial period, but also cites a large number of older sources. Many of the contributors to this volume refer to him, and consequently we will consider his work in greater detail here.

In his *Naturalis historia*, Pliny dedicates books 33 to 37 to metals, ores, painting/pigments, stones and precious gems. But these chapters can also be read as a discourse upon mediality and materiality. In the following discussion, we will consult Pliny’s text with regard to the material effects discussed earlier from a theoretical point of view; that is, aesthetics, semantics and function. In doing so, it will become clear that although Pliny does not model his considerations systematically upon these categories, but many of his remarks can be related to them\(^{56}\).

**The Social Value of Materials: Luxury and Decadence**

At the heart of Pliny’s *Naturalis historia* there lies a specific aspect of material semantics, namely the social value (*pretium*) of materials, which he discusses in the introduction to Book 33: *Metalla nunc ipsaeque opes et rerum pretia dicentur*.\(^{57}\) In Books 33 to 37 he describes the social history of

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\(^{54}\) For further qualities of glass, see Swift, this volume.

\(^{55}\) See Plant, this volume.

\(^{56}\) This is fundamental to the discourse of materiality in Pliny: see Anguissola – Grüner, 2020.

\(^{57}\) Plin. HN 33, 1: ‘Our topic now will be metals, and the actual metals. Resources employed to pay for commodities.’
different materials, noting that their value can be explained by their changing social uses. Gold, for example, was rare in Rome (it was initially hidden away inside the Temple of Saturn) until the spoils of war made it somewhat more common. During the 5th century B.C., the rhetorician Gorgias commissioned a statue of himself in solid gold at Delphi, whereas in Rome this practice began significantly later. Gold also only came gradually into use for jewellery – the rings used as a symbol of marriage were initially made from iron, and only changed to gold at the end of the Republic. Pliny presents the conquest of Asia as a turning point in the handling of gold. Lucius Cornelius Scipio brought 1500 pounds of golden vessels back to Rome from Asia. We can also observe a progression from simple copper coins to silver and gold coinage over the course of the Republic. Taking the discussion of gold as an exemplary case, it is clear that Pliny binds his history of materials with an extensive critique of luxury and carries this on into a discussion on decadence. Other materials, such as silver and precious stones, are also described by Pliny in terms of an escalation in luxurious living and a concomitant moral decline.

Pliny himself is aware that a material’s worth is the result of the interplay between its various qualities. In the case of gold, the crucial factor for Pliny is that gold does not lose any of its value when exposed to fire: rather its quality increases. There are also aesthetic qualities such as its shine and colour, but it shares these with other materials. With respect to stones and pigments, additional aspects that determine a material’s value are mentioned: its rarity, the difficulty of its acquisition and the transport costs associated with shipping it to Rome. Marble, which was quarried and shipped to Rome at great expense and effort, is the ultimate expression of luxuria for Pliny. Above all, however, Pliny implies in his *Naturalis historia* that materials necessarily take the form of objects by linking materials and objects always and exclusively. The total economic value of objects can only be assessed through the value of both the materials employed and the ‘aesthetic labour’ invested in them. Gold and silver, he tells us, can be made more expensive through processing or smithing. In the case of gems, *ars* is also a factor in the increasing of their value. Terracotta vessels, which are produced from a material of comparatively low value (clay), can become more precious than their stone counterparts after firing. Finally, this increase in value is particularly obvious in the case of bronze: through their ‘audacious’ and ‘miraculous’ production bronze statues gain great admiration and material value. Luxuria is therefore expressed not only in the use of ever more exquisite materials, but also through the ever evolving techniques applied

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58 The iterative criticism of precious materials exploited by intensive mining, the destruction of nature and the wasteful use of resources represents a form of proto-environmentalism: see Wallace-Hadrill 1990, 85–90.
59 Plin. HN 33, 14–16.
60 Plin. HN 33, 83.
61 Plin. HN 33, 8–13. 17–34.
62 Plin. HN 33, 148.
63 Plin. HN 33, 42–47.
64 Isager 1991, 52–55. 70–73. Pliny indicates the correlation between *avaritia* and *luxuria*; for more on *luxuria*, which is expressed through the use of gold: see Isager 1991, 57–66; Beagon 1992, 75–79. 190–194; Lao 2011.
65 Plin. HN 36, 1: *insania morum*.
66 Plin. HN 33, 59.
67 Plin. HN 33, 58.
68 Plin. HN 33, 164; 34, 48; 36, 55. 59.
70 Böhme 1995, 35 f. For Böhme, the atmospheres of spaces are influenced by the ‘aesthetic labour’ invested in them, such as architectural ornaments, interior design or object design.
71 Plin. HN 33, 4.
72 Plin. HN 33, 22; see Lang, this volume.
73 Plin. HN 35, 162.
in artisanal production. When discussing silver vessels, Pliny states explicitly that no one type of form or craft remained in fashion for long: *vasa ex argento mire inconstantia humani ingenii variat nullum genus officinac dui probando*.

Social appraisal is therefore always based on the use of certain materials and the artistic craftsmanship invested in the finished product. This aspect of the ancient critique of luxury has already been discussed thoroughly in modern scholarship, which has recognised that the increasing decadence of the Late Republic constituted a veritable cultural revolution, creating the requisite conditions for Pliny’s observations. Admiration and criticism are therefore tightly bound within Pliny’s work. This also applies to content and style: the author’s meticulous great, almost tiresome attention to detail is presented in a strikingly simple style that lends formal expression to the critical attitude towards luxury phenomena.

**Semantics of Materials**

In Pliny, the critique of luxury provides a culturally specific framework of interpretation, in relation to which the more specific semanticisation of the materials are carried out. In the following examples, it is clear that the iconology of the materials refers to a cultural system. Thus, Pliny reports that Italian cult images and the architectural ornament applied to temples were originally made from terracotta. Even when gold and silver became available in later periods, these terracotta elements, which Pliny associated with *firma* (endurance), conveyed an importance sense of sacrosanctity, as well as a certain innocence: *mira caelatura et arte suique firmitate, sanctiora auro, certe inno-centiora*. Marble is also loaded with different cultural meanings. Since every type of marble had to be imported into Rome, Pliny characterised the Hymettan marble as foreign and therefore by implication sumptuous or excessive.

Colours can also be semantically charged, either through association or social use. Pliny reports that for some people, the value of gold is revealed by its colour and shine, which can be likened to that of the stars. To a certain extent, then, gold possesses a heavenly quality. Pliny also notes the cultural value associated with *minium* (cinnabar), which was applied to the face of statues depicting Jupiter, as well as to the bodies of *triumphatores*. Through these social practices *minium* acquired an enhanced, almost royal connotation.

Although Pliny offers important insights into the semantic associations of particular materials, it is useful to consult other authors as well. However, each single author holds a specific (and ideologically permeated) view of materials. Consequently, the perspective of Pliny, especially his criticism of luxury, must also be contextualised in this sense.

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75 Plin. HN 33, 139: ‘Fashions in silver plate undergo marvellous variations owing to the vagaries of human taste, no kind of workmanship remaining long in favour.’
76 E. g., Neudecker 1988; regarding Pliny specifically, see Wallace-Hadrill 1990.
78 E. g., Lao 2011, 55.
79 Wallace-Hadrill 1990, 80f.
80 The term ‘semanticisation’ denotes a process of attributing personal, social, cultural or other symbolic meanings to ‘something’, e. g., images, objects or materials. Siefkes (2012, 69) defines seven principles of semanticisation, which include (1) frame connection, (2) style, (3) iconicity, (4) individual experiences, (5) cultural allusions, (6) connection to social groups, (7) specific contexts; for ‘semanticisations’ see also Baranov 2006; Bracker 2020, 3f.
81 Plin. HN 34, 35.
82 Plin. HN 35, 158; Grüner 2017, 27–29, with further sources that connect the use of terracotta with old Roman virtues.
83 Plin. HN 36, 7: *peregrines*.
84 Plin. HN 33, 58.
85 On colour, see Lepik-Kopaczynska 1958, 82; Healy 1999, 259.
Aesthetics of Materials

Pliny also touches on the various aesthetic qualities of materials, which – in addition to the function of the things in question – establish their social value, with the visible surface being of particular import. Pliny devotes a whole book to the qualities of colours (Plin. HN 35), for example. In relation to painting, he states that forms are created through (contour) lines87 and monochrome shading (therefore also colour differences)88. Light and dark tones89 are used to produce light and shadow (lumen/umbra), and in addition to this brown ochre from Sinop can be employed to produce a shine (splendor)90. Thus, painting plays with contrasts (tonos) and shading (harmogen)91, with the result that certain colours achieve different aesthetic effects. They can be austerus (austere) or floridus (vivid)92, terms that were also adopted in rhetoric93. These particular effects were associated with specific colours: minium/cinnabar, armenium/azurite, cinnabaris/dragon’s blood, chrysocolla/blue-green or yellow-white, indicum/indigo and purpurissum/bright purple are all considered as floridus. All other colours are austerus. With these statements, Pliny outlines a proper aesthetics of colour, especially with respect to wall painting. While identifying various painters by name94 and judging their treatment of colours95 he defines wall painting as an independent ‘artistic genre’.

Furthermore, for Pliny colour and paint are not only qualities of wall surfaces. Their aesthetic effects were used for other surface modifications as well. Regarding this, the respective pigments are chosen in accordance with the medium: different types are used for panel-paintings, buildings, ships, the production of ink and for fabric dyeing96, to name but a few examples.

Coloured architectural surfaces can also be achieved, Pliny reminds us, through the application of marble veneers97, a practice that was still novel during the author’s lifetime98. In Rome, the equestrian Mamurra, a military officer under Caesar, was the first to outfit his house with marble veneers and decorative marble columns99. Pliny also notes that the colour effects and patterns vary greatly according to the type of marble used – Lucullus, for example, famously brought black marble to Rome100. He suggests that Egyptian marbles, which arrived under Augustus and Tiberius, can be distinguished by their wave-like pleats and striped patterns101. These stone surfaces

88 Plin. HN 35, 15f. Originally, pictures were produced using silhouettes; on the contextualisation of painting outlines and contours, see Kurbjuhn 2014, 55–57.
89 Plin. HN 35, 29: differentia colorum.
90 Plin. HN 35, 31. For different types of whiteness (e.g., albus or canditus), their reference to particular material aesthetics and semantic connotations in the Roman period, see Barry 2020, 41–46.
91 Plin. HN 35, 29: tandem se ars ipsa distinxit et invent lumen atque umbras, differentia colorum alterna vice sese excitante. postea deinde adiectus est splendor, alius hic quam lumen. quod inter haec et umbras esset, appellarunt tonon, commissuras vero colorum et transitus harmogen. See also Pollitt 1974, 399 f. (who makes reference to Plin. HN 35, 131); Isager 1991, 123; Grüner 2014, 447.
92 Plin. HN 35, 30.
93 On austerus and floridus, see Pollitt 1974, 321–325, 373–375, respectively. For a less aesthetic and more technical reading of these terms, see Lepik-Kopaczska (1958, 79–99), who suggests that the colores floridi listed by Pliny are coloured glazes composed of multiple layers, in contrast to the colores austeri, which are simple opaque colours manufactured from clay, chalk or iron oxide.
95 In relation to specific painters – namely, Aristides and Nicophanes – Pliny (HN 35, 37, 98) notes the ‘hard’ effect (durus) of their colours; see also Pollitt 1974, 359–361.
96 Plin, HN 25, 43; 35, 35, 37, 44.
97 Plin. HN 35, 2.
98 On marble veneer, see Barker, this volume.
99 Plin. HN 36, 48. On marble columns, see Beck, this volume.
100 Plin. HN 36, 49; Isager 1991, 186.
101 Plin. HN 36, 55.
therefore possess a natural form of ornamentation. The gilding of walls during the Flavian period replaces references to a natural landscape with an artificial, ‘deceptive’ strategy.

Importantly, colour effects also play a role in the production of bronze. For example, Pliny differentiates the various types of Corinthian bronze by their colour: (1) a white variety, coming very near to silver in brilliance, (2) a version in which the yellow quality of gold dominates, (3) a type in which all the metals were blended in equal proportions and (4) a darker class that was typically produced by accident.

In addition to colour, further aesthetic effects like reflection and shine are also decisive for the appearance of materials. Pliny praises a particular type of opal for its soft shine after polishing. Using the example of carbunculi and its varieties he details the qualities of shine, reflection and brilliance. ‘Masculine’ stones are more brilliant, whereas ‘feminine’ stones have a weaker lustre. Pliny notes that Indian carbunculi lack brilliance and look generally flawed, with a ‘parched’ lustre. According to Callistratus, a carbunculus ought to cast a brilliant, colourless radiance, so that when placed on a surface it enhances the lustre of other stones, thanks to its own glowing brilliance. In this passage on carbunculi it becomes clear how varied the linguistic references to the quality of shine can be: Pliny uses the words fulgor, flagrare, lucrem fundere, and flammae. Shine is also central to the discussion of silver and gold, with Pliny arguing that the shine of the former extends beyond that of the latter. In the light of oil-lamps, however, electrum (a gold-silver alloy) shines even brighter than silver, he says. Such visual brilliance was apparently not always desirable, however, since Pliny also describes the ways in which silver could be made matte, with its value actually increasing as a result.

In addition to shine and reflection, transparency also plays an important role in the aesthetic appearance of materials. This is particularly relevant for certain types of stones. In the case of emeralds, Pliny differentiates between opaque, semi-opaque and translucent varieties: hinc genera distinguishing, ut sint aliqui obscurs, quos vocant caecos, alii densi nec e liquido tralucidi [...] Corresponding categories can also be found in his characterisations of other materials: good onyx

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102 Thus, marble columns in temples do not only serve a static function but can also be used as a display of splendour (lautitia): see Plin. HN 36, 45. Evans (2008, 120) sees this as a conflict between ‘substance and appearance’.
103 Plin. HN 35, 2f.
104 See Anguissola, this volume.
105 Plin. HN 33, 8.
106 García Morcillo 2010, 446f.
107 Plin. HN 37, 84.
108 Plin. HN 37, 92–94.
109 The writer Callistratus is unknown outside of Pliny: see Riddle 1973, 8; RE X 2 (1919) 1748 s.v. ‘Kallistratos’ (no. 41) (Kroll).
110 Grünner (2014, 439–448) stresses the importance of shine for Roman material aesthetics, referring in particular to representations of shine in the Second Style (where gloss serves as ornamentum) and also Vitruvius.
111 Plin. HN 33, 58: longius fulget.
112 Plin. HN 33, 81: clarus argento splendere.
113 Plin. HN 33, 131: fulgor excaecare.
114 Plin. HN 37, 68.
Annette Haug and Adrian Hielscher

is opaque\textsuperscript{115}, whereas obsidian is sometimes translucent\textsuperscript{116} and is therefore also valued for wall decorations, because he believes that translucent materials change the quality of the light in a particular space. A white stone with yellow veins from Cappadocia was used to decorate the interior of the Temple of Fortuna Seiana, and this stone is described by Pliny as candidus atque tralucens and phengites on the basis of its diaphanous qualities\textsuperscript{117}. Through the use of this stone, he says, the temple’s interior remained bright even when the doors were closed.

Pliny’s high sensitivity for the appearance of objects appears also in his reflections upon the relationship between surface and core, specifically with reference to the modification of surfaces. He notes, for instance, that walls can be clad in marble and portable objects finished with a surface of gold\textsuperscript{118}, silver or lead\textsuperscript{119}. In the latter case, the metal finish becomes an ornamentum of the object in question\textsuperscript{120}, and through its application, the original surface is hidden – a subject that Pliny mostly comments critically upon. From his perspective, this act represents a manipulation of nature and thus a sacrilege; as a consequence, the classification of the substance itself becomes questionable\textsuperscript{121}. Furthermore, he points out that not only can a ‘core’ material be fully covered, it can also be modified. Marble veneer, for example, may be concealed under a coat of paint, producing the especially attractive visual effect ‘variance’ (varietas). By creating artificially modified marble patterns and thus unnatural (ornamental) surfaces, Pliny suggests that it is possible to transcend the uniformity of natural types of the stone\textsuperscript{122}.

Finally, Pliny suggests that the aesthetic significance of surfaces leads to the imitation of materials, which he considers to be a deception (fraus), with respect to both gold and jewels\textsuperscript{123}. Nonetheless it is also clear to him that specific aesthetic effects are produced by the artificial manufacture of materials\textsuperscript{124}. Artificially produced stones, for example, are noted as possessing a brilliance and shine comparable to that of silver\textsuperscript{125}.

**Functions of Materials**

Importantly, Pliny discusses various materials against the background of their usefulness (utilitas) for particular purposes\textsuperscript{126}. These general ideas are then refined further. For Pliny, stability, durability and resistance (firmitas) are the most important qualities for materials. These requirements are applicable in the choice of construction materials, in particular, which are to be as weatherproof as possible. He points out that the Greeks, for example, used ceramic bricks extensively due to their durability\textsuperscript{127}. However, he argues that the use of brick had long been avoided in domestic building at Rome because brick walls need to be built quite thick in order to support multiple floors\textsuperscript{128}. Pliny notes that density and resistance (spissa firmitas), as well as hardness (duritia), are desirable

\textsuperscript{115} Plin. HN 36, 61: non tralucidus.
\textsuperscript{116} Plin. HN 36, 196.
\textsuperscript{117} Plin. HN 36, 163.
\textsuperscript{118} Jex-Blake – Sellers 1968, 6f.
\textsuperscript{119} Plin. HN 34, 5, 162; 35, 2.
\textsuperscript{120} Plin. HN 34, 163.
\textsuperscript{121} Plin. HN 35, 3: unitatem variare; Carey 2003, 109–111. For the artistic realisation of coloured marble patterns in ancient wall painting, see Barry 2020, 80–103; for Roman antiquity esp. 96–103.
\textsuperscript{123} In scholarship, Pliny has been largely received in abbreviated form. He is viewed as the founder of a tradition of thinking that postulates the primacy of nature over the artificial-artisanal production of materials: see Rohde 2015, 129.
\textsuperscript{124} Plin. HN 37, 98: aliquando et pusulis argenti modo relucentibus.
\textsuperscript{125} Plin. HN 35, 172: sunt aeterni.
\textsuperscript{126} E. g., Plin. HN 13, 63; 14, 88; 34, 121.
\textsuperscript{127} Plin. HN 35, 172; sunt aeterni.
qualities when identifying construction timber, even if this makes the material more difficult to work\textsuperscript{129}. He also discusses the suitability of different stones for construction in detail. Decisive factors include the stone’s capacity to withstand (without cracking) the salt content of the sea air, as well as wind, rain, damp, cold and frost; ideally, fire should not harm it either\textsuperscript{130}. Thus, he recognises that the durability and suitability of a material is always dependent upon the climatic conditions, and for this reason different construction materials and techniques are used in warmer and colder regions, respectively\textsuperscript{131}. Construction materials and techniques combine to lend a building \textit{firmitas}.

Durability is also an important quality for portable objects. For Pliny, the real value of gold lies in the fact that it cannot be damaged by fire, does not rust, and does not ‘wear out’ with use\textsuperscript{132}. But he also recognises that, depending upon the functional context, other material qualities can be of greater import: due to its hardness, for instance, iron is an excellent material for the production of weapons and tools\textsuperscript{133}. As a consequence, he suggests that it can become more valuable than gold in a time of war\textsuperscript{134}. Yet because iron rusts quickly, its use-life is comparatively short\textsuperscript{135}. Pliny makes similar observations about ceramic vessels, for which durability (\textit{firmitas}) is likewise considered as a mark of quality\textsuperscript{136}. He views the reversal of this value as evidence for decadence, noting that the value of crystal vessels is consequence of their fragility (\textit{fragilitas}). The latter instance constitutes a particularly clear expression of \textit{luxuria}: \textit{hoc argumentum opum, haec vera luxuriae gloria existimata est, habere quod posset statim perire totum}\textsuperscript{137}.

The \textbf{capacity to be processed} is another important quality of materials, according to Pliny. Thus, construction materials must not only be hard and weatherproof, but also be easy to work with. He points out that round stones are therefore quite unsuitable for construction, even if they are very hard\textsuperscript{138}. With respect to metals, gold is again distinguished by Pliny for its malleability\textsuperscript{139} and the great variety of processing possibilities that it offers\textsuperscript{140}. It can be worked into virtually any form, he says, including thin sheets (for gilding), metal plates and even gold thread, which can be used for the weaving of cloth\textsuperscript{141}. Iron, for its part, combines a great capacity for processing with hardness, which is achieved by creating iron alloys in combination with other metals\textsuperscript{142}. Conversely, bronze combines malleability\textsuperscript{143}, stability and shine, making it particularly suitable for the production of statues (including colossal representations of gods, as well as portraits)\textsuperscript{144}, everyday objects such as lamps and tables, and also architectural elements such as thresholds and columns\textsuperscript{145}. Furthermore, Pliny notes, materials may possess qualities that make them appropriate for specific

\textsuperscript{129} Plin. HN 16, 206f.
\textsuperscript{130} Plin. HN 36, 166–168.
\textsuperscript{131} Plin. HN 36, 186.
\textsuperscript{132} Plin. HN 33, 59 f. 62; Isager 1991, 64.
\textsuperscript{133} Plin. HN 34, 138f. Pliny discusses the concept of ‘hardness’ only implicitly. Healy (1999, 273) postulates that ‘hardness’ was not generally a descriptive category in ancient thought. Nonetheless, Pliny (HN 36, 159) describes Siphnian stone as naturally soft (\textit{natura mollissimus}), but also reports that it becomes black and hard (\textit{durescit}) when cooked in oil. \textit{Durus} and \textit{mollis} can therefore be recognised as two of this stone’s material qualities.
\textsuperscript{134} Plin. HN 33, 1.
\textsuperscript{135} Plin. HN 34, 141.
\textsuperscript{136} Plin. HN 35, 161f.
\textsuperscript{137} Plin. HN 33, 5: ‘It came to be deemed the proof of wealth, the true glory of luxury, to possess something that might be absolutely destroyed in a moment’.
\textsuperscript{138} Plin. HN 36, 168.
\textsuperscript{139} Plin. HN 33, 59. 61.
\textsuperscript{140} Healy 1999, 272.
\textsuperscript{141} Plin. HN 33, 61–63; Healy 1999, 288–293.
\textsuperscript{142} Plin. HN 34, 94, 144, 156.
\textsuperscript{143} Bronze acquires malleability through (among other things) the ductility and low melting point of the copper it contains. These qualities of bronze were praised repeatedly by Pliny and also brought into comparison with other metals (Plin. HN 34, 5, 46, 94, 97): see Healy 1999, 301–305.
\textsuperscript{144} Isager 1991, 80–103.
\textsuperscript{145} Plin. HN 34, 11. 13–17. 20–32. 39–45.
uses. Silver is well-suited for the production of mirrors, for instance, because it not only shines, but also reflects images: *est natura mira imagines reddendi, quod repercusso aere atque in oculos regesto fieri convenit*\(^{146}\). The form of the mirror – whether convex, concave or flat – determines the size and shape of the reflected image\(^{147}\).

Pliny names a countless number of these specific material functions (we need only recall the list of substances used in medicine) that do not need to be further elaborated here. The fundamental idea remains nonetheless the same: that specific materials are particularly well-suited to specific uses.

**This Volume**

The preceding analysis of ancient sources links the theoretical concepts of materiality to the ancient world and helps to sharpen the phenomena that will be examined in this volume. With regard to aesthetics, the focus is on the sensual qualities of materials – specifically on their surfaces. The various contributions will address materials' appearance as well as their intentional display and performance. Consequently, the colours, visual effects and textures (as well as specific textural effects such as luminance and shine) that Pliny characterises in so many facets are particularly relevant. The camouflaging of surfaces will also be emphasised. Architectural structures, for example, can be hidden by revetment (for example, veneers that simulate marble or stucco that covers the walls), while object surfaces can also be modified (gilded, for instance). In these cases, there are tensions between ‘core’ and ‘surface’ or ‘above’ and ‘below’ that can be addressed. Such interplay becomes particularly interesting when the original surface remains partially visible. Imitation, the third important aspect of material, is also important, as it introduces an artificial and often ornamented material aesthetic, thereby creating a value of its own.

The semantics of materials are the result of social negotiations. When dealing with contexts from antiquity, this conventional meaning can be approached through an analysis of written sources. But such analysis provides an isolated and ideologically/conceptually impregnated view. Alternatively, we may approach (basic) semantics via the material’s actual use in and for specific contexts. It is then the contextual embedding that permits a semantic analysis, not only from a chronological and geographic perspective, but also with respect to specific building types (including locations within) and in combination with other visual elements. As a consequence, contrasts between relative categories such as new/old, local/foreign, traditional/innovative and cheap/expensive can shed further light onto particular materials and their meaning.

In addition to aesthetics and semantics, usability (*utilitas*) is one of the central qualities of a material. The choice of specific materials must meet basic functional requirements, and thus the contributions in this volume will address the ways in which different needs might compete with one another. Material choice also reflects the prevailing expectations associated with an object or a space. In the case of huge vaults, for instance, architectonic form is related directly to a particular material: *opus caementicium*. Consequently, the efficacy of the material is implicitly displayed even if it is not visible. A weapon produced in a material that augments its destructive potential represents another clear example. However, material logic can be undermined for specific aesthetic, semantic-communicative or economic reasons. Glass vessels privilege aesthetics and enjoyable taste over durability (*firmitas*), and here the fragility of the material enhances its social value.

All three aspects – aesthetics, semantics and function – are integral to the contributions presented here, although with differing levels of emphasis. Naturally the materials employed, their

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146 Plin. HN 33, 128: ‘Still, the property of reflecting images is marvellous; it is generally agreed that it takes place owing to the repercussion of the air which is thrown back into the eyes.’

147 Plin. HN 33, 128–130.
technical treatment and their function depend upon the context and the media involved. This volume makes a basic distinction between ‘material spaces’ (that is, the architecture that surrounds us) and portable objects, but in the comparison of these two media contexts, overlaps and entanglements always arise.

Monika Wagner starts the book by introducing a modern case study: the Barcelona Pavilion designed by Mies van der Rohe. This building provides a model for the analysis of material and surface, as well as surface properties and their semantic connotations. Here, marble and glass were employed to create different gloss and shine effects. In the historical context of the 1920s, these visual effects not only met the taste of the time, but also functioned as ‘social equalisers’. Based on a large quantity of quality-source material, this contribution sets out the methodological framework for the entire volume.

Anna Anguissola’s contribution transposes Wagner’s approach to antiquity, focusing on the aesthetic and semantic properties of gold and gilded surfaces discussed in Pliny’s *Naturalis historia*. Gold is typically analysed in terms of the tension between its economic value, functional and aesthetic properties (for example, durability and brilliance) and social meaning (for example, appropriateness, decency, restraint, lavishness). Pliny blames the increased interest in the material’s economic value for the loss of art’s relevance in Roman society. Gilding, which disguises the ‘original’ surface and alters the natural qualities and material integrity of an object, lies at the heart of this problem. The article thus broadly embeds the *Naturalis historia* into discourses concerning material semantics and relationships between a series of oppositions: core and surface, essence and appearance, nature and art, value and effect.

The papers that follow focus on material aesthetics in architectural spaces. Each contribution has chosen a specific building material as its starting point. Through a close reading of visual properties, these phenomenological studies unpack different aesthetic strategies that come into play, producing some important new revelations regarding the performance, imitation and camouflaging of surfaces.

Tobias Busen examines the design of construction elements that were intended to be covered by stucco during the final stage of a building process. Despite their later disappearance, these raw structures still sometimes received a basic ‘aesthetic’ treatment – an effect that could only be perceived while construction was underway. Such a strategy is apparent in the ornamental use of *opus reticulatum* and the design of ‘window wall’ in the Casa del Citarista at Pompeii. The latter was built using faux *opus africanum* in an attempt to convince viewers of its antiquity. Thus, even basic building materials had a significance beyond functional necessity, becoming an important medium for communication during construction.

Simon Barker examines in detail the marble revetments that Pliny so vividly rejects. Marble facing became one of the most valuable forms of wall decoration in central Italy during the Late Republic and the Early Imperial period. Although the prestige associated with this (rare) material perhaps motivated property owners to use this form of decoration initially, the multisensory effects created by marble, especially in its interaction with light and water, became increasingly desirable over time. Aside from its visual appearance, the sounds produced by marble and its palpable coolness became important aspects for the perception of this material.

Dennis Beck’s study of polychrome marble columns in monumental public buildings shows that these decorative architectural features appeared more frequently from the Augustan period onwards. In contexts such as the Temple of Apollo Sosianus or the Forum Augustum, the use of coloured marble generated new aesthetic effects, playing with homogeneity and variety. Marble building elements (where structure and surface material coincide) and cladding (*opera sectilia* on floors; veneer on walls) interacted, predominantly in interiors but also on façades. Marble was most commonly employed in ‘perceptual zones’, i.e., the lower third of a building. The fluting and polishing of marble columns further enhanced the visual effects they produced. Beck’s paper shows that the material properties of marble were adopted for specific decorative strategies.
Jessica Plant examines Roman stuccoed ceilings, which were a highly versatile surface medium within Augustan domestic contexts. Stuccoed ceilings could make reference to underlying architecture, but they could also obscure it or even create a fictive setting. Beyond this interplay of surface and structure, the surface itself took on a performative role, becoming a medium with the potential to generate atmospheric effects. The common white or cream colour of stuccoed ceilings (in the Villa della Farnesina, for example) suggests solidity, while also producing an airy effect. The plasticity of these ceilings creates light and shadow effects, producing a three-dimensional quality that often contrasts with the two-dimensional wall-paintings positioned below. By introducing picture panels, stuccoed ceilings also contributed to the semantics of a room, while the figural images themselves continued the visual play. Stuccoed ceilings thus enlarged the pictorial space of a room both physically and conceptually.

Referring to the concept of an ‘aesthetic cloud’, Arne Reinhardt compares two very different types of architectural terracotta: high-quality relief slabs of the Campana type, which date to the Late Republic and Early Imperial periods, and bichrome brick façades of the 2nd century A.D. He questions the view that terracotta bore patriotic and traditionalist connotations, instead emphasising the specific aesthetic effects that the material could create. In the case of Campana plaques, this aesthetic varied significantly, since they could be left bare, painted or stuccoed and painted, with each choice also having an effect on the plaque’s figurative imagery. During the 2nd century A.D., a group of mausolea broke with the established convention of hiding terracotta and brickwork under layers of plaster and paint. The artificial interplay of patterns, colours and polish observed on the exteriors of these buildings can be interpreted as an entirely new expression of this material.

The next two papers build on the performance and social use of building materials by focusing upon their meaning. Here material semantics emerge from the tension between the functional appropriation of a given material and its social esteem.

In contrast to other contributions in the volume, Dominik Maschek does not choose a reception aesthetic approach. He claims that reflections on semantics should not be based on literary sources such as Pliny or the potentially manifold perceptions of viewers, but rather on the pragmatic long-term use of materials for prominent public building projects. He argues that this practice must be based on the aesthetic and semantic expectations of the client (meaning his/her vernacular knowledge) and an expert understanding of the (assumed) functionality and workability of materials.

Matthias Grawehr provides a case study for the pragmatic use of a semantically loaded building material: travertine. Travertine was introduced to Rome at the end of the 2nd century B.C., and during its initial fluorescence the material was typically covered under a layer of plaster. It was not until the Augustan period that exposed travertine appeared, and by the Flavian period it had become quite popular, possibly in reaction to the abundant use of marble and other luxury materials during the reign of Nero. According to the criteria of Vitruvius and Pliny, who emphasise the qualities of firmitas (endurance) and utilitas (workability), travertine was not the ideal building material. But the stone’s local availability, as well as its popular semantic associations (it was considered to be ‘solid’ and ‘reliable’) made it more attractive during the reign of the Flavians.

The contributions in the book’s final section explore the materiality of objects by focussing on the interdependence of aesthetics, semantics and functionality. The first two contributions, from Adrian Hielscher and Ellen Swift, discuss both the interdependency and tension between the aesthetics of a material, its function and its social use.

Adrian Hielscher’s case study of four-legged marble tables (mensae) from houses in Pompeii examines the relevance of material to an objects’ form and function, as well as its aesthetics and semantics. Marble, a fragile material, is technically unsuitable for the production of these tables, which were originally made from wood. Above all, regarding the utilisation possibilities of mensae marble lends tables a heaviness (in comparison to light, mobile furniture). Occupying the centre
of the atrium, mensae were used to perform actions and to stage objects. Their aesthetic results from the interplay between their linear shape and the specific qualities of the marble (for example, its opacity or translucence). The social meaning of these tables in Pompeian atria blurs the line between ‘domestic furniture’ and ‘public object’.

Ellen Swift analyses vessels made of glass, metal and organic materials. Despite its fragility, glass was used to create food and drink containers due to its neutral taste, its transparency, and its workability, the latter encouraging the production of designs incorporating spectacular forms and colours. The opaque character of metal vessels, on the other hand, could be used to surprise the consumer with an image that only became visible when the vessel is emptied. The third category, organic vessels, possessed a specific taste and smell, as well as a characteristic weight and tactile temperature. With respect to this latter group, a relevant point for all object categories becomes evident: all the senses were needed to fully experience the material characteristics of a particular object.

In Jörn Lang’s phenomenological discussion of Roman cameos, the aesthetic staging of the material comes to the fore. The natural material qualities (natura) of a precious stone and the intervention of human workmanship/design (ars) are merged in cameos to create a unique visual appearance. The material’s aesthetic idiosyncrasies, such as colour, texture or shape could prefigure the artist’s approach to producing the decoration. Literary sources tell us that nature could even ‘become’ art as a stone’s natural features could be ‘seen as’ an image. In the case of agates, this dynamic is reversed, and art is used to change the ‘natural’ appearance of a stone.

The contributions by Benjamin Engels and Manuel Flecker address a specific aspect of material: intermateriality. Both turn away from the simplistic concept of skeuomorphism and refer to a concept of intermateriality that can be divided into three different modes: material interaction (such as the combination of materials), material transfer (of one material into the appearance of another) and material interference (creating a new aesthetic).

Benjamin Engels chooses a specific material group to discuss transmaterial modes of design: stone urns that imitate wickerwork. These fall into two chronological and regional groups: basket urns from Rome dating to the Late Republic and Early Augustan period; and the ‘Aquileia group’, produced mainly during the 1st century A.D. The urns are distinguished by differing degrees of proximity to and divergence from basket prototypes. While some marble baskets (exclusively from Rome) appear to invest in a naturalistic mimesis of the organic prototype (sometimes even mimicking weaving faults), others (the entire ‘Aquileia group’) transfer the surface texture into an ornamental order. The urns thus oscillate between a three-dimensional image-object and an ornamented functional object (i.e., an urn) in their own right.

Manuel Flecker broadens the perspective by analysing the phenomenon of intermaterial relationships between different genres of material culture (marble objects, Arretine sigillata, pottery, cameo glass, glazed ceramics) from a diachronic perspective (2nd century B.C. – 1st century A.D.). Each group of materials exhibits specific dynamics in its play with intermateriality. Early marble craters and candelabra incorporate characteristics from toreutic models and fuse them into something new. Arretine sigillata, with its sharp edges and figurative scenes, makes reference to silverware, even though the former was often produced in alternative shapes and larger sizes. From a broader historical perspective, the observations made by Engels are confirmed: references to specific archetypes lose importance over time in favour of a freer adaptation that takes into account the inherent laws of the object group.

All the contributions in this volume bring material and its decorative potential to the fore. The use of particular materials is a result of their (sometimes competing) functional, aesthetic and semantic (communicative) qualities, all of which were highlighted in the colloquium and appear throughout this book. Intentional use (producer’s perspective) and perception (perceiver’s perspective) are interwoven components of a cultural and social network, and mutually define each other. It becomes evident that materials, just like forms, ornaments and images, are a significant and multi-layered constituent of Roman decor and design.
In this sense, materiality (as a specific quality of things) is also subject to the concept of *decorum*, or ‘appropriateness’, as explained by Vitruvius\(^{148}\) and his general ideas on *decor* are applicable to the function, semantics and aesthetics of materials, in particular. In terms of functionality, building materials must meet static requirements and be able to withstand various weather conditions (Busen), while glass is considered an appropriate material for the production of tableware because of its sensorial neutrality (Swift). However, this functionality is often undermined by aesthetic preferences and social messages – as in the use of (comparatively soft) marble to decorate buildings (Grawehr) or intricate tables (Hielscher). Such interferences of functional, aesthetic and semantic concepts are particularly evident in the case of transmaterial designs (Engels; Flecker). Furthermore, material appropriateness also becomes apparent in the aesthetic staging of specific material qualities: making marble columns shine (Beck), highlighting the visual qualities of precious stones (Lang) or staging the effects of stuccoed ceilings (Plant). However, it has also become clear that the Roman practice of decoration included a predilection for artificial material effects, such as the imitation or transformation of materials (Lang). It is hardly surprising that faux materials and/or incompetently amended surfaces were criticised as inappropriate (Anguissola). Perhaps most importantly, appropriateness is defined by the (historically changeable) social use of materials. This idea has been discussed intensively in the critique of luxury (Anguissola; Barker). Furthermore, changes in social use become apparent in the appearance of marble first in the public and then in the private realm (Beck; Barker), the demonstrative use of travertine in the Flavian period (Grawehr) and the use of terracotta as a building material (Reinhardt).

Overall, the reflections on the aesthetics, semantics and function of materials presented in this volume are to be understood as a first step towards a cultural history of material that is yet to be written.

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\(^{148}\) Haug 2020; for a summary, see Haug 2021,2: ‘Form should relate to content, individual decorative or architectural features should fit the appearance of the whole, decoration should be in accordance with traditional concepts of *decor*, architectural spaces and their *decor* should refer to the natural setting (in doing so they should match with modes of use and perception) and finally *decor*-spaces should meet the social needs of their users.’
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