Function and Its Discontents

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»Houses are built to live in, and not to look on [...].
Leave the goodly fabrics of houses, for beauty only,
to the enchanted palaces of the poets, who build
them with small cost« (Francis Bacon).

In the *City of God*, St. Augustine points out something strange: the higher a thing stands on the scale of nature, the more value it possesses: inanimate things are the lowest, and then come plants, animals, and finally human beings – and yet, »who would not rather have bread in his house than mice, gold than fleas [...] more is often given for a horse than for a slave, for a jewel than for a maid.« Commenting on this point, St. Thomas Aquinas explains that things are not valued according to their natural dignity, otherwise a living creature such as a mouse would be valued higher than a pearl, but with reference to human needs, i. e. according to their use value.[1]

In architectural theory, the Vitruvian criteria of *firmitas* and *venustas* represent inherent qualities of a building (such as sound construction and proportionality), but *utilitas* is a relational value that depends on how aptly the building serves the user.[2] While these objective values are evident to anyone once the building has been realized, it takes an architect to form a conception of the convenience and propriety of a building before construction.[3] Given the crucial role that Vitruvius has played in Western architecture, it is odd that celebrated masterpieces of the building art often fall short on utility. Palladio's Villa Rotonda provoked Goethe to state that »inwendig kann man es wohnbar, aber nicht wöhnlich nennen.«[4] Yet this was a positive judgment compared to how Thomas Stonborough, the inhabitant of the Palais Wittgenstein in Vienna, described this architectural jewel: »prinzipiell nicht bewohnbar.«[5] Le Corbusier's Villa Savoye was used for less than a year before the owners left it to rot, and the Farnsworth House by Ludwig Mies van der Rohe has been empty for most of its existence. The client, Dr. Edith Farnsworth actually sued Mies for designing a house that could not be used for anything – but the case was decided in favor of the architect, and Paul Rudolph quipped that Mies was able to make wonderful buildings only because he deliberately ignored so many aspects of a building, including function.[6] In such cases, it is sometimes argued that exceptional aesthetic qualities compensate for the lack of functionality. Talking about a detail in St. Mark's church in Venice, John Ruskin explains that »like other beautiful things in this world, its end is to be beautiful; and, in proportion to its beauty, it receives permission to be otherwise useless.«[7]

1 Augustine, Bk. XI, Ch. 16; Aquinas, lib. V, lect. 9

2 Vitruv 1960 [ca. 30 v. Chr.]: 3. Unpretentiously, Vitruvius explains that *firmitas* »will be assured when foundations are carried down to the solid ground and materials wisely and liberally selected«; *utilitas*, »when the arrangement of the apartments is faultless and presents no hindrance to use, and when each class of building is assigned to its suitable and appropriate exposure;« and *venustas*, »when the appearance of the work is pleasing and in good taste, and when its members are in due proportion according to correct principles of symmetry.«

3 Ibid.: 8

4 von Goethe 1978 [1813-1817]: 55

5 Leitner 1976: 23, 32; Stadler 1982: 537

6 Rudolph stated that »all problems can never be solved, indeed it is a characteristic of the twentieth century that architects are highly selective in determining which problems they want to solve. Mies, for instance, makes wonderful buildings only because he ignores many aspects of a building. If he solved more problems, his buildings would be far less potent« Rudolph 1961. As quoted in Venturi 1966: 16.

7 Ruskin 1851-1853: 34

Marginal utility

In more general terms, Ruskin insists that the purpose of a cathedral is not so much to shelter the congregation as to awe them.[8] Architecture begins where necessity ends because it concerns itself only with those characters of an edifice which are above and beyond its common use. He insists that »no-one would call the laws architectural which determine the height of a breastwork or the position of a bastion. But if to the stone facing of that bastion be added an unnecessary feature, as a cable moulding, that is architecture.«[9] Anticipating Georges Bataille general economy of waste, he even claims that economic sacrifice creates cultural value: »it is not the church we want, but the sacrifice [...] not the gift but the giving.«[10]

This attitude towards *utilitas* goes back to ancient Greece and the institution of euergetism. Aristotle teaches that a magnificent man proves himself through *megaloprepeia* or great expenditure, not by spending on himself but lavishing gifts upon the public: paying for a bridge, a temple, a gymnasium, or a banquet for citizens, oil for athletes, prizes for school boys. Those expenses are the most magnificent which only happen once, involve the whole city or relate to strangers.[11] Nor should the city shy away from its euergetic responsibility to offer common meals for free to all citizens. In the *Politica*, Aristotle articulates the concrete architectural consequences of this principle. Unlike Plato, he believes that a city needs to protect itself against aggression with a wall with towered gates; but mere utility is not enough, the wall must also become an ornament to the city.[12] Moreover, the beautiful wall should be cross-programmed to provide the location for the free and common meals:

> »As the walls are to be divided by bulwarks and towers built at suitable intervals, and the body of citizens must be distributed at common tables, the idea will naturally occur that some of the common tables should be housed in the guard-houses.«[13]

As opposed to such a magnanimous view of culture, few people today want to deliberately waste money on architecture. In western democracies, any investment in public architecture that goes beyond merely utilitarian necessities tends to be viewed with suspicion – whereby utility is understood as that which can be quantified as the return of investment. This is part of the reason why the most progressive architecture today is sponsored either by countries with the most repressive regimes or by private enterprises with an equally determined leadership.[14] More and more often, star architects are commissioned to celebrate a ruler or a corporation with their own special brand of architecture. In such commissions, the desired quality is less *utilitas* than uniqueness. For example, in his design for the CCTV headquarters Rem Koolhaas chose to give the building an irrational cantilevered shape so that it would remain forever as unique as the phoenix.[15]

Could it then be that *utilitas* is expected of a banal building, while a work of architecture is governed by the logic of *utilitas marginalis*? The theory of marginalism says that the price of an object is determined neither by its usefulness, nor by how much labor was required for its production, but rather by its marginal utility. As more of a good is consumed, its total utility increases but its marginal utility decreases. Conversely, scarcity adds marginal value.
This phenomenon has been known since ancient times.[16] While acknowledging that the best of things is water, Aristotle notes that people are nonetheless

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8 Ruskin 1887: 278

9 Ruskin 1887: 16

10 Ibid.: 25

11 Aristotle: Ethica Nicomachea: iv, 2 (1122a 35, 1123a 4–8); Id.: De Virtutibus et Vitiis: 1250b 25-27. The acts of magnificence are first and foremost liturgies of which the Philosopher mentions *trierarchia, choregia* and *architheoria*.

12 Aristotle: Politica: 1331a, 10-14

13 Ibid.: 1331a 19-24
The institution of common meals which Aristotle dates back to king Minos of Crete, was widespread in Greece. At Rhodes, rich men were feeding the poor by the food liturgies under which each wealthy man looked after a certain number of poor; at Samos, corn was distributed to all citizens free.
Tarn 1961: 108-109. Veyne 1992: 16, 99

14 Peter Eisenman explains the phenomenon by asserting that »the more centralized the power, the less compromises need to be made in architecture.« As quoted in Pogrebin 2008.

15 The jury valued the lack of economic and structural rationality in the CCTV concept. Fong 2007

16 According to Aristotle »external goods have a limit, like any other instrument, and all things useful are of such a nature that where there is too much of them, they must either do harm, or at any rate be of no use, to their possessors.« Aristotle, Politica 1323b, 7-10

willing to pay much more for things that have no use value at all, and argues that »what is rare is a greater good than what is plentiful. Thus gold is a better thing than iron, though less useful: it is harder to get, and therefore better worth getting.«[17] In the Middle Ages, the principle was reformulated with more precision by Peter John Olivi who identifies two kinds of value, objective and relative. The latter is made of three components: *virtuositas* or use value; *complacibilitas* or desirability; and finally, *raritas* or scarcity.[18] The *virtuositas* of a house is not the quality of the building itself but that which the house will give to a particular user, such as protection against rain and sun or animals and burglars (i. e. roughly the *utilitas* of Vitruvius). However, these virtues make no difference if they are not perceived, along with aesthetic and other values, as *complacibilitas*. Further, the desirability of any particular house decreases if there are many of them to choose from, and increases in relation to its rarity.

This logic suggests that utility is incidental to the architectural value of a significant building. More strongly, some writers have insisted that architecture must emancipate itself from functionality in order to become art. Defining beauty as *Zweckmässigkeit ohne Zweck*, or purposiveness without a purpose, Immanuel Kant concluded that a building could only be beautiful if it were not to be a church; that is, if it could not be measured relative to a purpose or subsumed under a concept.[19] Such a notion later inspired German expressionists to develop abstract painting and anti-functionalist architecture. Whereas Otto Wagner singled out *correct functionality* as the main condition of art and explained that a smooth but accurate cannon is more beautiful than a decorated one that misses its target, Bruno Taut defended his non-functional projects as follows:

> »Yes, impractical and without utility! But have we become happy through utility? Always utility: comfort, convenience – good food, education – knives, forks, trains, toilets and yet also – cannons, bombs, instruments of murder!«[20]

Taut brings up an important point. When we judge whether an object, or a building, serves a purpose, we expect the purpose to be worth serving. If the function of a building is taken to be synonymous with the effects it engenders or events it witnesses, as in Jeff Kipnis' Infrastructural Tenet, the condition of utilitas becomes as trivial as the reading of *firmitas* as non-collapsing construction.[21] Instead, with Hannah Arendt, we have to ask, »And what is the use of use?«[22] She distinguishes between ›in order to‹, or utility, and ›for the sake of‹, or meaningfulness. Utilitarian reasoning sometimes gets caught in the unending chain of means and ends without ever arriving at some final goal that needs no further justification. In modernity, Arendt charges, the ›in order to‹ has become the content of the ›for the sake of‹; in her opinion, utility established as meaning only leads to meaninglessness.[23]

Function and form in architecture theory

While Wagner stressed the importance of utilitas he did not make it the foundation of other values. For example, he declared that »nothing that is impractical can be beautiful.«[24] To be beautiful, a thing must function even if there may be well-functioning things that are not beautiful. Since the lack of function entails the lack of beauty, *utilitas* logically follows from *venustas*. Three decades later, Taut took the opposite position in maintaining that if something

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17 Aristotle, Rhetorica 1364a24-6; see also Topica 117b, 28-30

18 Roover 1967

19 »Man würde vieles unmittelbar in der Anschauung Gefallende an einem Gebäude anbringen können, wenn es nur nicht eine Kirche sein sollte.« Kant 1963 [1790]: 109-111

20 Wagner as quoted in Moravanszky 1995: 15: »die richtige Zweckerfüllung die Hauptbedingungen der Kunst ist, dass eine glatte aber zielsichere Kanone schöner als eine verzierte ohne diese Eigenschaft.« Taut 2004: »Ja unpraktisch und ohne Nutzen! Aber sind wir vom Nutzen glücklich geworden? Immer Nutzen: Comfort, Bequemlichkeit, – gutes Essen, Bildung – Messer, Gabel, Eisenbahnnen, Closets und doch auch – Kanonen, Bomben, Mordgeräte! Bloß Nützliches und Bequemes wollen ohne höhere Ideen ist Langeweile. Langeweile bringt Zank, Streit und Krieg: Lüge, Raub, Mord, Elend, millionenfach fliegendes Blut.«

21 The Infrastructural Tenet, as defined by Jeffrey Kipnis, attempts to draw architectural consequence of the ambitious Deleuzean term, *event*. He proposes the concept of *event-structure* to indicate all of the social activities and chance events, desirable or not, that an architectural setting stages and conditions. These include, but are not limited to, the expressed activities of the functional program. An event-structure is congruent with the program when no significant events in a setting are encouraged by the architecture other than those pre-written in the program, though, of course, absolute congruence can never be achieved. An architect may reasonably strive for a congruent event-structure in a prison or a hospital, but such an extreme congruence would, according to Kipnis, be intolerable in a house. Pointing out that the event-structure of a sidewalk on a busy street far exceeds its program – sometimes dangerously – Kipnis argues that an unexpectedly high level of event-structure incongruity occurred in

functions well, it also looks good; if something looks bad it cannot function well.[25] For Taut, then, venustas follows from *utilitas*. Logically enough, Taut defines maximal utility as the first condition of architecture, and instructs that the construction and beauty be subordinated to it.[26]

The ideologist of 1980s ›post-functionalism‹, Peter Eisenman rejected Taut's reasoning and argued that a building needs to have a function (if the architect ever hopes to persuade anyone to pay for it), but it need neither represent nor celebrate that function.[27] Consequently, he developed elaborate methods of generating forms into which he then retrofitted the client's program. Paradoxically, this approach has been described as experimental when in fact it could hardly be more pragmatic and down to earth: most normal people never have a building designed to meet their particular needs, but rather look for locations and spaces that best correspond to their expectations and budgets.
While Eisenman deconstructed the logocentric opposition of function versus form, some more recent architects have reversed the modernist hierarchy but maintained the traditional opposition. A good example is Patrik Schumacher who describes the opposition as the »lead-distinction« in architecture and other design disciplines. In order to present parametricism as »the great new style after modernism« he chose to change the old saying, »form follows function«, into the new slogan: »form powers function.«[28]

Presumably Schumacher chose not to simply reverse the Sullivanian formula in order to escape the dilemma of representation, as defined by Gilles Deleuze. Inspired by Henri Bergson, Deleuze differentiated between possible vs. real and virtual vs. actual. In this scholastic model, the possible is exactly like the real except that it lacks existence. Hence, even if a possibility would be realized, the process would not be creative: nothing new and no difference would emerge. The movement from the possible to the real is then characterized by preformation, resemblance and limitation: an architectural form that follows one function prevents all other possible uses from taking place. By contrast, the movement from the virtual to the actual is creative, for »while the real is the image and likeness of the possible that it realizes, the actual [...] does not resemble the virtuality that it embodies. With no preformed order to dictate the form, the actualization of virtual being is a creative evolution, an original differentiation of organization.«[29] In this sense, it is reasonable to generate architectural forms that lack a program but have the ability to ›power function‹, unlimited by any pre-existing condition.

A detail in a building by Eisenman may serve as an illustration. In the Wexner Center, the forms have been determined from a complex overlay of a grid (in four different scales) and virtual fragments of the Armory Building, an OSU gym that was situated nearby but demolished in the 1950s. One of the Armory tower fragments extends down to the café on the underground level: a semi-cylindrical niche made of brick, it reflects sound to a virtual center half a meter off the wall. Occasionally visitors discover this curious effect and play with it for a while. This acoustic function is not intended, it is not mentioned in the program and does not even have a name; yet it is sponsored or ›powered‹ by the unusual shape of the brick wall.
Nonetheless, we have to ask whether such an effect deserves to be called a function. Often it is very hard to separate form and function in architecture; most often, they are co-constituted in ways that justify their alleged interdependence. Louis Sullivan's writings are a case in point.[30] In *Kindergarten Chats*, he suggests that the interrelation between form and function has no begin-

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early shopping malls, particularly in the U. S. and Japan. Though the program of the mall was confined to circulation and shopping, the event-structure in these buildings so burgeoned that they became the public spaces of choice, particularly for adolescents and young adults. More importantly, Kipnis finds that freedom can be engendered by architecture when the event-structure is not only incongruent with a building's program, but exceeds it to the point of interference. He explains: »In political terms, intensifying the event-structure amounts to unaligned activism, to a profligate operation that does not selectively enfranchise so much as it diminishes restriction. When achieved, it muffles a badgering program and distracts the visitor with frissons of danger and excitement as it magnifies the possibility of the unexpected. It should, in principle, stage a richer range of all events – including none« Kipnis 1996: 31, 36. The theory harbors a number of conceptual problems. For example, Kipnis not only fails to make a distinction between *freedom from* and *free dom to*, as suggested by Guido Ruggiero and Isaiah Berlin, but even more dramatically he confuses freedom with unpredictability. Normally we would not call it freedom if we get into a traffic accident, even if (and precisely when) we could not have seen it in advance.

22 Arendt imputes this question to Gotthold Ephraim Lessing, albeit without giving a source, in two texts: *Human Condition* (1958: 154), and *Between Past and Future* (1961: 80)

23 Arendt 1958: 174

24 Wagner 2008: 44: »etwas Unpraktisches kann nicht schön sein«

25 Taut 1929: 6: »Was gut funktioniert, sieht gut aus. Wir glauben einfach nicht mehr daran, dass etwas schlecht aussieht und doch gut funktioniert.«

ning and no end, as outward appearances tend to resemble inner purposes.[31] The examples that are supposed to demonstrate this connection are peculiar to the extreme:

> »the form, oak-tree, resembles and expresses the purpose or function, oak; [...] the form, rain, indicates the function, rain; [...] the form, smile, makes us aware of the function, smile; [...] the form, literature, means nothing more or less than the function, literature; [...] the form, water, the function, water; [...] All is form, all is function.«[32]

In such parlance, the form is simply the manifestation of the function, defined as »a vital something or other which we do not see.«[33] The problem is that nothing follows from this principle because it is always trivially true. As Sullivan wants a normative design theory, he needs to define the crucial concepts so that the correspondence becomes contingent. Indeed, Sullivan accuses other architects of violating his fundamental principle – which indicates it cannot have been a law of nature but rather a moral imperative.[34] An actor may habitually and professionally employ the form, smile, even though in his heart he does not experience the sentiment that would animate the function, smile. An architect, in Sullivan's view, is not entitled to such a displacement.

Function and form in nature

Sullivan's distinction between function and form corresponds roughly to Aristotle's distinction between form and matter. In Aristotelianism, an entity is defined by its essence or nature.[35] All natural movement is directed towards the actualization of the essence. In fact, a thing is true, good and beautiful to the extent that its essence has been realized.[36] Thus, the actualization of the essence is not only the natural law in Aristotle's philosophy; it is the highest ethical principle as well.

But how can we determine the essence? Aristotle maintained that what each thing is when fully developed, we call its nature. Thus, the nature of an acorn is the full-grown oak tree, its final cause or *telos*, just as the original cause of the oak is the acorn. He claims that everything is already there at the origin: the seed possesses everything that the tree will one day exhibit but the essence or nature of the plant has not yet unfolded in full.

Aristotelian essentialism agrees with the functionalist principle of designing von *innen nach aussen* and with Le Corbusier's statement that »the value of all things lies in their purpose, the germinating seed« for the purpose of a thing is nothing but its final end or essence; and essence is certainly the germinating seed and the basis of value.[37] However, the best example of functionalist teleology may be nature, at least if we can believe Aristotle. The Master of Those Who Know explains that

> »the absence of haphazard and conduciveness of everything to an end are to be found in Nature's works in the highest degree, and the resultant end of her generations and combinations is a form of the beautiful.«[38]

For two thousand years after Aristotle, natural organisms have been described as paradigms of functionality; this alleged perfection has also formed the foundation for the theological Design Argument. From different premises, the theory of evolution has also inspired many popular writers to think that everything in nature must serve a positive purpose, since every useless mutation

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26 Taut 1929: 6: »1. An der Spitze aller Forderungen an einen Bau steht die bestmögliche Benutzbarkeit. 2. Das verwendete Material und die verwendete Konstruktion muß sich völlig der ersten These unterordnen. 3. Die Schönheit entsteht aus der direkten Beziehung zwischen Bau und Zweck, aus den natürlichen Eigenschaften des Materials und aus der Eleganz der Konstruktion.«

27 In the essay, *Strong Form, Weak Form*, Eisenman explains that »a building has to function, but it does not have to look like it functions« and in his analysis of Mies van der Rohe, *MiMiSes READING: does not mean A THING* he identifies designs that »function but do not make function their theme.« See Eisenman 1993: 16, 24, 52, 69-70 et passim.

28 Schumacher 2011a: 207; Schumacher 2011b

29 Deleuze 1994: 97

30 The original statement is in the 1896 essay *The Tall Office Building Artistically Considered* where Sullivan writes: »It is my belief that it is of the very essence of every problem that it contains and suggests its own solution. This I believe to be natural law. Let us examine, then, carefully the elements, let us search out this contained suggestion, this essence of the problem. [...] All things in nature have a shape, that is to say, a form, an outward semblance, that tells us what they are, that distinguishes them from ourselves and from each other. Unfailingly in nature these shapes express the inner life, the native quality, of the animal, tree, bird, fish, that they present to us; they are so characteristic, so recognizable, that we say, simply, it is 'natural' it should be so. [...] Unceasingly the essence of things is taking shape in the matter of things, and this unspeakable process we call birth and growth. [...] Whether it be the sweeping eagle in his flight or the open apple-blossom, the toiling work-horse, the blithe swan, the branching oak, the winding stream at its base, the drifting clouds, over all the

is supposed to have been weeded out by natural selection. However, a quick study of any organism will quickly reveal a number of parts for which no adequate explanation in terms of shape, structure or function can be given. In the human body, the appendix is generally understood as serving no function but it is also difficult to determine what the function of the pineal gland is, unless one accepts Descartes' conjecture that it is the seat of the soul. According to Stephen Jay Gould, useless organs represent a byproduct, a residue or a transitional stage of previously functional adaptations.[39] Moreover, many of our functioning organs are far from ideal. The spine, for example, is not a very structure to support the weight of the body. Compared to many other animals, we run slowly, have weak arms and practically no sense of smell; our teeth rot and our skin burns all too easily. According to Gary Marcus, the human mind is no better: it is also a *Kluge*, a haphazard improvisation that barely manages to do the necessary.[40] And then there are some very obvious complaints, such as the existence of death. Theologists know that death (just like the pains of childbirth) were instituted as God's punishment for original sin; gerontologists insist that senescence and death are biologically necessary even in the farthest reaches of any bizarre universe. More recently, however, the inevitability of senescence has been disputed. After all, this hypothesis was derived from a handful of model species, including humans, lab rats, fruit flies and the elegant nematode worm, *Caenorhabditis elegans*.[41]

Not only is there little reason to describe the human being as a perfectly functional organism, it is also far from evident that ecosystems would naturally be in the state of a perfect homeostasis, unless upset by the thoughtless interventions of man. Besides, nature does not only fail in functional, but also aesthetic respects. Immediately after stating his Aristotelian definition of beauty as a state of harmony so perfect that every change, addition or omission would be for the worse, Leonbattista Alberti complains that this noble and divine quality is almost never found in nature: »How extraordinary a Thing is a handsome Youth in Athens!«[42] Arguing against the Design Argument, David Hume concluded that since our world is very faulty and imperfect we can only assume it to be

> »the first rude essay of some infant deity, who afterwards abandoned it, ashamed of his lame performance; it is the work only of some dependent, inferior deity; and is the object of derision to his superiors; it is the production of old age and dotage in some superannuated deity.«[43]

Use and function

In order to develop a more precise theory, it is necessary to consider the meaning of word such as ›use‹ or ›function‹. The word ›use‹ normally implies a purpose or consequences that are intended by the user.[44] Thus, a frustrated sigh, »it's no use«, suggests that a particular act would not serve any purpose. Such usage only applies to intentional contexts: if I use an object to achieve a particular purpose and thereby also inadvertently cause certain other effects, one would not normally say I used the object to achieve these unintended effects. Thus, a commuter does not normally use his car to pollute the environment but to get quickly from home to work, even though pollution might well be one of the consequences of his driving the car. In other words, we cannot determine the use of an object from the actual consequences because the word ›use‹ entails intention or purpose, and many if not most consequences of

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coursing sun, form ever follows function, and this is the law. Where function does not change form does not change. The granite rocks, the ever-brooding hills, remain for ages; the lightning lives, comes into shape, and dies in a twinkling. It is the pervading law of all things organic and inorganic, of all things physical and metaphysical, of all things human and all things superhuman, of all true manifestations of the head, of the heart, of the soul, that life is recognizable in its expression, that form ever follows function. This is the law. Shall we, then, daily violate this law in our art? Are we so decadent, so imbecile, so utterly weak of eyesight, that we cannot perceive this truth so simple, so very simple? Is it really then, a very marvelous thing, or is it rather so commonplace, so everyday, so near a thing to us, that we cannot perceive that the shape, form, outward expression, design or whatever we may choose, of the tall office building should in the very nature of things follow the functions of the building, and that where the function does not change, the form is not to change? Sullivan 1979: 203, 207, 208

31 He means that in a state of nature a form exists because of the corresponding function, and this something behind the form is neither more nor less than »a manifestation of what you call the infinite creative spirit, and what I call God.« Sullivan 1979: 46

32 Sullivan 1979: 43-45

33 Ibid.: 46

34 Ibid.: 208

35 Phys. 230b26; Pol. 1252b31-33

36 Aristotle, De Caelo 217a33, De Anima 415b8-26

37 Le Corbusier 1964: 201

any act are unintentional.

Although the expression, ›unconscious intention‹, is in most contexts nothing but an oxymoron, there are theories – e. g. varieties of Freudianism and Marxism – that postulate unconscious motives for some actions of a person. However, these theories usually construct special subjects with intentions of their own. To explain why a person does self-destructive things, Freud postulates a substitute agent that Wilhelm Stekel named *thanatos*, or the death drive, »whose function is to assure that the organism shall follow its own path to death«; similarly, Marx follows Adam Smith and David Ricardo in imagining invisible agents whose intentions sometimes force the hand of unwitting persons.[45]

Moreover, even though we normally talk about use only in relation to a purpose that the user intends, we do not necessarily intend all the elements of our actions, but only the goal. Thus, when I decide to walk home after work, I do not intend to move my left leg first, and my right leg next. I remain in blissful ignorance of my legwork just as I might unconsciously avoid bumping into other people or cars. My conscious mind is focused on getting home for a yet higher-level purpose, whatever that might be.

Of course, the actual use of an object need not be the use intended by the designer or manufacturer. I can tell my friend to use my favorite jacket for his big job interview; here the suggestion is that he uses the object as envisaged by the tailor, as a dashing fashion statement. By contrast, I could tell him to use my not-so-favorite jacket for his nefarious experiments with natural dyes from the Amazonas, or to clean the floor afterwards. In this case, what I find appropriate to the task is less the cut of the jacket than the fabric, although both aspects were intended by the tailor. Some cases of unintended uses are conventionally classified as abuse. The friend could burn the jacket out of frustration after not getting the job. He does something to the object intentionally but I would hesitate to say he is using the object, unless a somewhat unusual purpose could be specified, such as »he is using the jacket to vent his anger.« Often, willful destruction would be understood as abuse, especially if no higher purposes could be invoked to justify it.

As opposed to the word ›use‹, ›function‹ is commonly used without assuming specific actors that have clearly defined purposes or intentions. To take an example, we can say that a machine is functioning when certain wheels in it are rotating etc. even if we could not determine the ultimate purpose or decide why somebody set it in motion. Here, however, we make assumptions of somebody's intentions, e. g. those of the designer of the machine. We say the machine is in function if it appears to be performing in the intended fashion.

Following this convention, we could say that a bicycle is ›in function‹ when it rides on a road, and moreover that a bicycle wheel is ›in function‹ when it rotates. If the wheel happens to be Duchamp's famous artwork, then the rotation does not serve the purpose of locomotion, but it might still be possible to say that the rotating wheel is in function. If Duchamp's wheel had been fixed so that it could not rotate, we might be tempted to say it is not really a wheel but an artistic representation (i. e. imitation) of a wheel. Here we would assume that it is in the essence of a wheel that it rotates.

The understanding of function as essence goes back to Aristotelianism. Arguing that the essence is what makes a thing what it is or what it is *propter se*, Aristotle writes in *De Anima*:

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38 Aristotle, De Caelo 271a35; De Partibus Animalium 645a23-26, 639bl9. Applying the concept of organic unity to all entities, Aristotle distinguishes between aggregates and wholes. The former possess a certain unity but only because of the contiguity of their parts; the latter's parts are held together by the unity of form. Logically and temporally, wholes are prior to their parts and represent their origin and end. Aristotle, Metaphysica 1016b7-17, 1023b26-1024al0

39 Gould 1979: 581-598

40 Marcus 2008: passim

41 Vaupel et al. 2004. The quotation is from Hamilton 1996: 90. For the classic position, consult Hamilton 1966: 12–45

42 Alberti: VI.2; cf. I.9; II.3; Aristotle: Politica: 1451a 32-35; Id.: Ethica Nichomachea: 1106b 10-15; Cicero: 28. Cicero claims that »so great is the force of nature that there is no man who would not choose to be like a man, nor, indeed, any ant that would not be like an ant. But like what man? For how few can pretend to beauty! When I was at Athens, the whole flock of youths afforded scarcely one. [...] to us who, after the examples of ancient philosophers, delight in boys, defects are often pleasing. Alcaeus was charmed with a wart on a boy's knuckle; but a wart is a blemish on the body; yet it seemed a beauty to him.« Cicero goes on to point out that Catulus found Roscius more beautiful than a God, even though the youth was squint-eyed. »But what signifies that, if his defects were beauties to Catulus?«

43 Hume 1980: 37

44 Still, there are also cases when we can talk about use without intention. For example, a lazy person could be condemned for merely »using air.« Here ›using‹ means the same as ›consuming‹, as also in ›using up‹ all the supplies, without any suggestion of a final goal or purpose.

>Suppose that what is literally an ›organ‹, like an axe, were a natural body, its ›essential whatness‹ would have been its essence, and so its soul; if this disappeared from it, it would have ceased to be an axe, except in name.«[46]

In this reading, then, the function determines the identity of the thing even if the function would not be actualized.

Biological function

During the Renaissance and the Baroque periods, such an Aristotelian reading of function is often said to have given way to the rise of mechanical thinking that is more causal than teleological. A case in point is William Harvey's *De motu cordis*.[47] While the ancients had identified the heart as the seat of the soul or emotions, Harvey defined the function of the heart as the mechanical pumping of blood through the circulatory system.[48]

However, teleological language did not disappear from biology even after Darwin's Origin of Species. In the twentieth century, Carl Hempel attempted to translate the teleological concept of biological function into deductive nomological explanation that would not only explain ›what‹ but also ›why‹.[49] Thus, Hempel rejected the suggestion that ›function‹ could be simply replaced by causal ›effect‹: while the heart has the effect of producing a certain sound, this is not its real function because it is not a necessary condition for the »proper working of the organism.« In criticism of Hempel's attempt, Robert Cummins points out that the heart is not necessary for circulation, artificial pumps having actually been incorporated into the circulatory systems of vertebrates in such a way as to preserve circulation and life.[50] Cummins concludes that »one cannot deduce hearts from circulation […] At best, one can deduce circulators from circulation.« It would be possible to render the proposition, »the function of the heart is to circulate the blood,« as »a blood circulator is a (necessary/ sufficient) condition of circulation, and *the heart is a blood circulator*.« However, as Cummins notes, the claim that the heart is a blood circulator is no less in need of an explanation than the claim that the function of the heart is to circulate the blood. Moreover, a causal analysis would not explain the presence of the elements any more than the angle of the sun and the length of the shadow of a flagpole would explain why the flagpole is precisely this height.

Consequently Cummins distinguishes between an evolutionary analysis and a functional analysis of the heart; the former tries to explain why there are hearts, the latter how they work.[51] He claims that »to ascribe a function to something is to ascribe a capacity to it which is singled out by its role in an analysis of some capacity of a containing system.«[52] That is, the function of an entity is its intrasystemic role in a larger system that carries out a certain activity. In this sense we can say that the function of the feline heart is to pump blood because this is its intrasystemic role in the activity of the circulatory system of a cat.

Obviously, this reasoning could be extended further. Blood circulation, in turn, has its own role in a larger system, that of sustaining the life of the animal. Furthermore, the continuing existence of the cat may be necessary for the functioning of a yet larger whole, the ecosystem: without cats, there might be an overpopulation of rats that could escalate into a catastrophe of some kind. In this way, the function of the heart is connected to the world understood as

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45 Freud 1961: 311. Adam Smith claims that »the rich … are led by an invisible hand … without intending it, without knowing it, [they] advance the interest of the society.« Smith 1774: 273

46 Aristotle, Metaphysica 1029b14; 1030a3; De Anima 412b13-14

47 Still, it should be recognized that Harvey was a conspicuous Aristotelian who maintained a prominent place for teleological explanation in anatomy while at the same time emphasizing the importance of mechanical reasoning both in his *De Motu Locali Animalium*, 1627 and *De Motu Cordis et Sanguinis in Animalibus* of 1628.

48 Peter M. Distelzweig (2009) has described Harvey's synthesis of Aristotelian teleology with mechanical reasoning in particular in *De Motu Locali Animalium* of 1627. Even the Master of Those Who Know himself makes tentative steps in this direction in *De Motu Animalium* and *De Incessu Animalium*.

49 In a different context, Hempel and Paul Oppenheim declared that »To explain the phenomena in the world of our experience, to answer the question ›why?‹ rather than only the question ›what?‹ is one of the foremost objectives of empirical science.« Hempel 1988: 9

50 Even if we would exclude such machines as an abnormality, other counter-examples could be produced. If we assume that the function of the kidneys is to eliminate wastes from the blood, then it follows that this is the function of either kidney. Yet, as Cummins points out, the presence of both kidneys is not, in normal circumstances, a necessary condition for the removal of the wastes. Cummins 1975: 741-765, here: 744-745

51 »While teleology seeks to answer a why-is-it-there question by answering a prior what-is-it-for question, functional analysis does not address a why-is-it-there question at all, but a how-does-it-work question.« Cummins 2002: 158

a Hegelian or an ecological superorganism. From this point of view, function is not an inherent property of an isolated entity but rather a relational property: the functionality of an element is derived from the functionality of the containing system. At the same time, the capacities of its containing system can only be explained by identifying the functions of its parts.

With such a causal role explanation, Cummins is able to explain what the normal heart does in pumping blood. He can also deal with other causal effects of the organ, such as the sound of the heartbeat which may have a function in another containing system: it may be helpful as diagnostic information, or it may calm a baby to sleep. One problem is to know what would count as an organism or a containing system. Does the newborn baby define the containing system for its organs, or should we include the mother (or another adult) as well, given that the baby is not yet able to survive on its own? Another problem is that we can seemingly construe an arbitrary number of containing systems and assign a function (or any number of functions) for any trait or entity. The function of the heart in a dead patient could be, for example, to save the life of someone else in the waiting line, or to fetch a handsome sum of money in the black market for organs. Such a non-normative account would then no longer allow for the concept of malfunction. Thus, senescence can be understood in negative terms as degeneration (a form of malfunctioning) or in positive terms as a tumor suppressor mechanism.

To propose a more eccentric example, we could suggest that the function of the digestive tract in the palm civet *(Paradoxurus hermaphroditus)* is to apply proteolytic enzymes to the coffee beans the animal has eaten and will later defecate, after which they will be roasted and sold as *kopi luwak*, the most expensive coffee in the world. Critics of the causal role theory, such as Ruth Garrett Millikan, would not accept this condition as a proper function of the civet's digestive tract, but only as its an accidental effect.

Millikan's position is a variation of the etiological theory of function, or what Cummins calls ›selected effects theory‹. The etiological explanation is based on causal relations but not those applying to the present moment. Rather it focuses on the causal history of the entity. The function of a trait (or entity) is F if the trait (or entity) was selected for F.[53] Thus, the proper function of the heart is to pump blood because ancestral animals with a heart had an evolutionary edge over heartless animals. According to this view, the production of sounds is not the proper function of the heart, but an accidental effect that may in some situations be beneficial.

Like Aristotle, Millikan argues that a thing is what it is by virtue of its proper function, not by virtue of its actual constitution, powers, or dispositions. The function of the heart is to pump blood, but this does not mean that ›pumping blood‹ and ›being a heart‹ were co-extensive. Every heart will eventually cease pumping without thereby ceasing to be heart; if the heart should fail to perform its proper function, it is sometimes necessary that blood be pumped with a mechanical device. Moreover, hearts also have other effects: they produce sounds and add to the weight of the body. An item may typically have a great many recurring effects: its direct proper function is the one that is historically responsible for its reproduction. Even a malfunctioning heart still has the direct proper function to pump blood, because it has been reproduced through organisms that, thanks in part to their own heart pumping blood, have had descendants similarly endowed with blood-pumping hearts.

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52 Cummins arrives at the following definition: »*x* functions as a φ in *s* (or: the function of *x* in *s* is to φ) relative to an analytical account A of *s*'s capacity to ψ just in case *x* is capable of φ-ing in *s* and A appropriately and adequately accounts for *s*'s capacity to ψ by, in part, appealing to the capacity of *x* to φ in *s*« Cummins 1975: 762

53 For an item A to have a direct proper function F it has to fulfill the following condition: »A originated as a ›reproduction‹ [...] of some prior item or items that, due in part to possession of the properties reproduced, have actually performed F in the past, and A exists because (causally, historically because) of this or these performances.« Millikan 1989: 288

On the other hand, parts of organisms that have emerged without the proper evolutionary history have no proper functions even if they seem to perform the same functions as normal organisms. Donald Davidson once imagined a perfect copy of himself, calling it the Swampman, who was created by a freak accident when a bolt of lightning rearranged a bunch of molecules in a swamp.[54] In Millikan's view, such a double lacks the right history, and so its parts do not have functions, only the marks of a function (dispositions etc.). Why an accidental combination of molecules is not an acceptable evolutionary history, is not specifically explained by Millikan; of course, random mutations do play a role in evolution.

The task of the theory of proper functions, according to Millikan, is to define the sense of ›supposed to‹ in naturalist, non-normative and non-mysterious terms.[55] Remarking that her definition of proper function is a definition of purpose, Millikan implies that there are purposes in nature independent of any human intention.[56] However, the argument only holds if we assume that the entities that she focuses on, such as the human being, are in some way necessary. Etiological theorists, such as Millikan or Karen Neander, argue that the heart has a natural proper function to pump blood because without this function the organism or the species would not have survived. However, such an explanation manages at best to define some necessary conditions for the survival of a particular species. Without a properly functioning heart, a person would expire and the entire human species would perish. From this causal fact we cannot derive the normative claim that the heart is there in order to fulfill this vital function. There also needs to be oxygen in the air for the human species to survive but that does not mean that the function of oxygen in earth's atmosphere is to support human life. Moreover, as Aristotle clearly recognized, the existence of individual human beings is neither necessary nor always desirable. Instead, he maintains that it is better to be dead than alive and best is not to be born at all.[57]

Echoing Arendt, John Searle asks what the function of function is. He notes that no new natural fact is added to the explanation when instead of saying, »the heart pumps blood« we say, »the function of the heart is to pump blood.« He argues that

> »either ›function‹ is defined in terms of causes, in which case there is nothing intrinsically functional about functions, they are just causes like any others, or functions are defined in terms of the furtherance of a set of values that we hold – life, survival, reproduction, health – in which case they are observer relative.«[58]

While Millikan talks about intentionality and purpose in nature, Searle concludes that all functions we discern in nature are in fact only projected onto it by human minds. The function talk concerning natural phenomena is merely an anthropomorphism, the application of language that only makes sense with regard to artifacts.

Artifact function

Aristotle distinguishes between things that exist by nature and those that do not.[59] Since »nature does nothing in vain«, natural things exist necessarily, while non-natural things, artifacts, depend on contingent intentions or chan-

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54 Davidson 1974: 15-38

55 Millikan 1984: 17

56 Millikan 1989: 291

57 Aristotle, Ethica Nichomachea 1215b15-22

58 Searle 1995: 16

59 Aristotle, Physica 192b9–18. For Aristotle, there are only three kinds of natural substances: the unmoved mover; celestial bodies; plants and animals.

ce.[60] The class of artifacts thus includes things that people intentionally make for a purpose (e. g. hammer) as well as experimental artifacts (i. e. unintended consequences of an experimental setup that may undermine the results of an experiment).

Insofar as we are talking about intentionally made artifacts, the concept always already entails a purpose or function. Whether a beaver dam or an anthill should be seen as artifacts depends on our conception of whether the animals are capable of intentions. In the opinion of many philosophers, nature is characterized by necessity (for example, causality) while a conscious intention is premised on a contingency, a free will exercising a choice over a range of alternatives. One can only intend A if there is the option of intending not-A. A similar contingency characterizes my reason – the purpose – for intending A. It is superfluous to intend something that is not in my power to decide: I do not intend to digest the food I eat. In normal circumstances, I do not intend to breathe either, although I can at times intentionally hold my breath or choose to breathe very deeply.

If as we understand artifacts as things that have been created intentionally, most products of human activity are not artifacts. If I intend to make a wooden table and in so doing also produce a large amount of sawdust, this dust is not seen as an artefact but a byproduct or waste. Moreover, not everything about an artifact is necessarily artifactual. Artifacts are created by a manipulation of other artifacts or natural things. An actual living tree might provide the raw material for my table, or I could screw industrially produced legs to a plastic tabletop.

Sometimes animals use human artifacts for their own purposes. The Australian bustard *(Ardeotis australis)* is known to use stone artifacts as gastroliths to grind food in its gastrointestinal tract; of course, natural stones of similar size, shape and hardness would do just as well. However, when the great bowerbird *(Chlamydera nuchalis)* decorates its bower with large quantities of stone artifacts of a particular color, it seems to select the objects with regard to properly artifactual qualities. There are also cases when animals change human artifacts to better serve their purposes. In an experiment at the University of Oxford, a New Caledonian crow *(Corvus moneduloides)* bent a piece of straight wire into a hook and used it to lift a bucket of delicious pig heart.[61] In this case, the human artifact is chosen and manipulated in a way that seems similar to how humans make artifacts.

Ontologically, an artifact can be a concrete physical particular (the chapel at Ronchamp), a type (the *Grand Comfort armchair*), or an abstract object (the Modulor proportional system). Even the concrete particular, such as the church, is not to be identified with the raw material that went into its making in that some of the components may be changed in repairs without the building ceasing to exist, as long as the original design is recognizable there. The chapel at Ronchamp may at some point collapse but the raw materials (or the atoms that make up those materials) may still persist. In fact, it is the intentional design by Le Corbusier that ties precisely these physical constituents (that make up concrete, steel and glass etc.) together to make the particular artifact.

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60 Aristotle, De Caelo 271a35; De Partibus Animalium 645a23-26; 639bl9.

61 Dwyer 1985; Wings 2007; Weir 2002; Taylor 2011.

Intention

A proponent of intentional theory of artifact function, Lynne Rudder Baker argues that all concrete objects (except for ›simples‹ if any such exist) are ultimately constituted by aggregates of objects. She emphasizes that constitution is a contingent and time-bound relation: the constituent elements can put together or separated in different ways.

For Baker, the persistence conditions of an artifact, such as a building, are given by its proper function. She asserts that artifacts are objects intentionally made to serve a given purpose while natural objects come into being without intervention by intentional agents. As a result, an artifact has its proper function essentially. Its nature lies in its proper function—what it was designed to do, the purpose for which it was produced.[62]

Baker further argues that to have a function, an object does not have to function. For example, the function of the hammer is to drive nails if this is what it was designed to do, even if it would never be used to that purpose. She points out that function entails the possibility of malfunction: »artefacts have *intended* functions, which are obviously normative. To carry out an intended function is what an artifact is *supposed* to do; to fail to carry out the function in certain circumstances is a kind of error, a malfunction.«[63] For Baker, intention is the source of normativity in artifacts, just like natural selection can be taken for the source of normativity in nature.

Baker's notion harbors several difficulties, some of which she considers herself. If the identity of an artifact depends on its proper function, as defined by authorial intention, then different functions entail different artifacts. However, sometimes functions change. Aspirin was originally sold as a painkiller, but later often prescribed as a blood thinner – what should we regard as its proper function? Baker's counterintuitive answer is that acetyl salicylic acid manufactured to cure headaches, or aspirin, should not be confused with aspirin, a completely different artifact that is made of acetyl salicylic acid for the purposes of thinning blood.[64]

Let if suffice to mention three additional problems. First, it seems that we should first be able to verify the intention behind an object before we can recognize whether it is an artifact at all. When I see a car, however, I feel it is safe to call it an artifact even without first asking the designer and manufacturer about their intentions. Second, it is not clear what is needed to assign a particular function to an object to turn it into an artifact. Assume I am in a forest and want to sit down; I find a rock and set it against another so as to make something that roughly approximates a chair. As the raw material has not been manipulated, the artifactuality of such a stone chair must lie in the configuration and the function. Conceivably, the change of configuration is not necessary either. If George Dickie is right in his claim that works of art are by necessity artifacts, then a driftwood sculpture must be an artifact even if the artist would not have changed anything at all in the found object.[65] Perhaps the piece is turned into an artifact by making it into a candidate of appreciation in a gallery. If so, what other kinds of functions would turn found natural objects into artifacts? If I pick an apple from a tree and eat it, have I transformed a natural pome, the means by which the apple tree disseminates its seeds, into a human artifact, ›a snack‹ with the proper function of nourishment? If eating is too natural to produce artifacts, could it work in the reverse:

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62 In more detail, Baker argues that »(1) Artifacts (and not natural objects) depend ontologically—not just causally—for their existence on human purposes. (2) Relatedly, artifacts are intention-dependent« (ID) objects that could not exist in a world without minds. Natural objects, which can be deployed to serve human purposes, would exist regardless of human intentions or practices. (3) Artifacts (and not natural objects) essentially have intended proper functions, bestowed on them by beings with beliefs, desires, and intentions.« Baker 2008: 3

63 Baker 2009: 83

64 Baker 2006: 135

65 Dickie 1974: 34; Dickie 1984: 80-82

what would happen if I ate an apple cut in the shape of a beautiful flower by an expert Thai fruit carver? That object, despite its somewhat unorthodox material, must be an artifact, a sculpture in particular; does it turn into something natural by being eaten?[66]

Thirdly, mere intention can hardly be enough to determine the identity of an artifact. In the late 1970s, Robert O. Williams, a one-time Beach Boys sax player from the Bay Area, discovered what he calls subtle energy fields; consequently he developed the ›Q-link‹, a device purportedly using ›Sympathetic Resonance Technology (SRT)‹ to not only help the human body deal with stress, lack of sleep, poor nutrition, pollutants and radiation, but also make electromagnetic fields from mobile phones disappear and increase the life of ordinary batteries. How does it work? The device contains a coil that is connected to nothing, a zero-ohm resistor, and some other unconnected small components but no power source. It could only succeed to produce the aforementioned effects if many of the laws of physics that we usually accept were utterly false.

Here it might be useful to draw a distinction between the function and the purpose of an artifact although in many contexts these terms are used synonymically. Insofar as we think of function as a capacity or disposition of an artifact, it seems reasonable to demand that whatever a thing cannot do should not be taken as its function. Still, it is not unusual that an artifact would be inadequate to its intended purpose, if purpose is understood as a mental disposition of an agent. It is possible that Williams intended the Q-link to improve concentration or that someone else uses it for that purpose even if the device can never actually have such an effect.[67]

Etiology

Intentional theories have difficulties in explaining the structural and other limitations to the ascriptions of function. Not surprisingly, then, etiological and causal role theories of biological function have also been extended to artifacts in order to replace the emphasis of intentions.

Inspired by Karen Neander and Ruth Millikan, many philosophers have defined the proper function of an artifact as the effect that prior tokens of the same type of artifacts have performed in the past and that have caused the item to be reproduced again and again.[68] Such a concept of proper function allows for malfunction as well as accidental functions or cases where an object ›functions as‹ something without this being its proper function. A book, say, S*MLXL*, can sometimes be used to balance a table, one leg of which is shorter than the others. It might even perform that function effectively – one advantage being that one could adjust the height to a fraction of a millimeter by removing the right number of pages – but not efficiently; should another doorstopper be needed, some of the expensive properties of *SMLXL* that do not contribute to that task (such as the text and illustrations printed on the pages) would probably not be reproduced. From such considerations, the etiological approach comes to the conclusion that to act as door leg extension is not the proper function of the Koolhaasian tome.[69]

Glenn Parsons explains that the proper function of a church is to facilitate religious feelings since the structure's ability to do this was the cause why any churches have been built.[70] Without considering other possible reasons for any

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66 To construct another example, can I transform a forest lake into an artifact, say a »swimming pond«, by deciding it would be a good place for a swim? If swimming is again too natural, consider the possibility that the Ironman triathlon is staged at that location and so the lake becomes a device to help choose the next Ironman.

67 Baker 2009: 89 responds: »The hammer does not cease to exist when the rubber head deteriorates. It just malfunctions, but there is still an ›it‹ that has an intended function—perhaps never to be carried out again. What exactly is the line, someone may ask, between having a hammer that is broken, and having something that is not a hammer at all? There is no sharp line.«

68 For example, Beth Preston argues that »The first step in the biological process is that a new trait arises by mutation or as the by-product of other traits. Alternatively, an existing trait may be used for a new operation. Similarly with artifacts, the first step is the production of a prototype by an inventor or designer, or someone puts an existing artifact to a new use. In biology, if the new trait or use of a trait is successful in its performance, and its success contributes to the reproductive success of its possessor, it thereby ensures its own reproduction as well. Similarly with artifacts, if the new artifact is successful it will be reproduced, initially, perhaps, for use by the inventor or designer, but later for use by other people. In the cultural milieu, this history of reproduction contingent upon success shows up as a history of manufacture and distribution by trade or sale. In the case of new uses

agent to engage in or promote church-building, he stresses that this is not a value judgment but a matter of fact:

> »to determine the proper function of a building, we need only look back to the causal history of the sort of structure in question, just as we might look back to the causal history of feathers or shovels to determine their proper functions.«[71]

Departing from the vulgar etiological model, Parsons admits that the original function of a thing may not be the reason why it is reproduced today. Bird feathers may have originally served the function of insulation and later facilitated flight; cellophane was the result of Jacques Brandenberger trying to develop a waterproof tablecloth but it is now used to wrap food items. Parsons concludes that »proper functions correspond not to all selected effects but to recently selected effects.« In effect, then, the proper function of an artifact has little to do with its history. Instead, the function is the reason why people recently (say, today) decided to produce that artifact, or others decided to buy it. In contrast to both the etiological theory and the causal role theory, but in line with the intentional account, Parsons conflates proper function with purpose (the reason why an agent chose to do something).[72]

The distinction between function and purpose is not the only problem in Parsons' theory. Another one has to do with the assumption that artifacts would be reproduced for a certain purpose which corresponds to a conventional understanding of function. There are things reproduced that have lost their function. The punt or dent *(le voleur)* in the bottom of a mass-produced wine-bottle is a non-functional reproduction of an obsolete glass-blowing technique; many elements of the Doric order may be skeuomorphs that reproduce timber construction details in another material. Moreover, there are also items that are reproduced that have never had much of a function. Why, for example, do women's jackets have buttons on the other side than men's jackets? Clearly the position of the buttons has nothing to do with closing the jacket. The suggestion that the buttoning is meant to differentiate between women's and men's clothing is also doubtful, as there are many other, and usually much more striking, ways to tell the difference. A more fundamental objection to Parsons is delivered by the Kantians out there who do things out of sense of duty, without regard to consequences.

The analogy between biological and artifact functions also fails with regard to the concepts of reproduction and selection.[73] First, the selection of artifacts, whether in the marketplace or in the head of the designer, involves intentional beings. Second, the designer, the manufacturer and the consumer make their selections for completely different reasons. From the fact that the iPhone has been manufactured in the millions and also copied by other manufacturers we cannot conclude that its technological functions (phone, organizer, camera, music player, etc.) would be the reason for its reproduction. It could also be that the commercial success of the device has more to do with the brand image that Apple has created than the iPhone's technical capabilities. From the point of view of the manufacturers of smart phones, the main reason for their reproduction is also the demand to deliver profits to stockholders.

Third, reproduction plays a completely different role in the design and production of artifacts or in the processes of natural selection. To make reproduction a necessary condition of function is particularly curious in the case of architec-

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of existing artifacts, they begin to be manufactured in whole or in part for the new market.« Preston 1998: 243-244. For a variation of the analogy, see also Origgi 2000: 140-169

69 The popular distinction between effectiveness and efficiency is not very sharp. Clearly, an act that is not effective in reaching the desired goals cannot be efficient either, no matter how few resources it would require. Here, ineffectiveness entails inefficiency. However, a very wasteful method is not effective either because it cannot be implemented. Here, inefficiency entails ineffectiveness.

70 As against Parsons, it should be pointed out that the construction of »the mother and head of all churches in the city and the world,« i. e. the Lateran basilica, was motivated by political concerns, as was the creation of the first Gothic church, the basilica of St. Denis. Parsons' idea that churches are built in order to facilitate religious feelings seems equally inconclusive if we consider nineteenth-century churches, such as the Sacre-Coeur in Paris, or the prefabricated metal churches erected by French officials and missionaries in Peru (San Marcos in Arica), the Philippines (San Sebastian in Manila), Mexico (Santa Bárbara in Santa Rosalia), or Gabon (Mission Ste Anne in Fernan Vaz near Omboué). See Curran 2000: 93-96; Simson 1974: 95-96; Harvey 1989: 200-228

71 Parsons 2011: 26, Parsons writes: »We might then say that churches have the proper function of facilitating religious worship, for instance, because, of all the various capacities that this kind of structure has, this particular one is the reason that contemporary buildings with that structure exist today. It is the structure's ability to facilitate (certain) religious feelings that caused it to ›catch on‹ and be reproduced at various places over time. All of this, importantly, is a matter of fact: to determine the proper function of a building, we need only look back to the causal history of the sort of structure in question, just as we might look back to

ture. Most buildings are not mass-produced and some, such as the CCTV head-quarters, are designed with the definite intention of remaining unique, one-off designs.[74] To remove this difficulty, Parsons suggests that the critical question with regard to architectural monuments (his example is the Royal Ontario Museum, built 1914 in Toronto by Frank Darling and John A. Pearson) should not be, »Why did it arise?« but rather, »Why is it still here?« This suggestion makes it possible to talk about a population of buildings (one of them actual, and all others merely potential) which is subjected to a process of selection. Moreover, it approximates Darwinist theory better than many other versions of the biological analogy. In terms of natural selection, it is not relevant to ask why a particular mutation arose (this could be a matter of chance), but why it has not disappeared from a population. However, this is where Parsons' analogy breaks down. In nature, a mutation is weeded out if it undermines the survival of the species; if it continues to appear, we can conclude it has not had a fatal affect on the population, even if it would seriously handicap an individual organism. For example, a peacock may be killed by a predator because its enormous tail makes it into an easy catch. Still, as suggested by Amotz Zahavi, such a deathly ornament may have a positive function for the species, as it lets the peahen to recognize the males with the strongest genes. By contrast, the fact that the museum in Toronto has not been replaced by other structures (even though the function of the museum, or so Parsons argues, has been made obsolete by electronic communications) does not allow us to determine any particular benefits for the corresponding population or species, whether we imagine this population to be architecture in general, public buildings in Canada, all buildings that could have been erected on this particular site, or whatever.

Fourth, if an artifact only has a function if it is reproduced by a number of people, as Parsons claims, then a singular prototype could never have any function at all. Not only does this idea go against normal linguistic conventions, it also makes the whole use of prototypes into a conundrum: if Edison's light bulb prototypes did not have any function, then what was he investigating?

Fifth, the reproduction of artifacts may have more to do with the perceived than actual effects or functions. Beth Preston claims that an artifact will be reproduced if it is successful in its proper function, just like in nature a new trait is reproduced if it is successful in its performance and its success contributes to the reproductive success of the organism. However, she also stresses that people may reproduce an artifact because of a mistaken idea about its proper function. Electric bug zappers are assumed to reduce the number of mosquitoes, but they may actually increase their number. Preston argues that the zappers do have a proper function (i. e. they are successful in doing something) and insists that this successful functioning will be the reason why they are reproduced, even if the people reproducing them have no idea what their real proper function is, and continue to believe it to be something completely opposite.[75] Unfortunately, she gives no reason to believe that all mistaken ascriptions of successful functions to artifacts would be grounded on real but unperceived proper functions. The device marketed as the ›Q-link‹ is an example where the expected (and perhaps even perceived) functions have little connection to the physical effects actually produced by the design. Of course, deceptive signals are quite common in nature as well.

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the causal history of feathers or shovels to determine their proper functions.«

72 Curiously, Parsons claims there is a fundamental difference between his variation of the selected effects theory and intentionalist approaches: »no individual human intention is sufficient to bestow proper function on an artifact: rather, proper functions emerge from collective, social behavior over time« (Parsons 2011: 26). Of course, his theory must then be classified as an intentionalist one, even if he postulates collective intentions.

73 For reviews of the analogy, see e. g. Lewens 2005; Lewens 2000; Nanay 2010.

74 In addition to the questionable analogy between natural selection and the intentional selection by designers, manufacturers and consumers, Millikan's theory has been criticized for its inability to explain new artifactual functions. To overcome this difficulty, Beth Preston has combined Millikan's etiological analysis with Cummins' system functions. In her sense, system functions are not proper since they are unrelated to the causal history of the item, and they cannot be ascribed to malfunctioning items. She goes as far as to suggest that proper functions may be regarded as ossified system functions. As against Preston's theory, Pieter Vermaas and Wybo Houkes point out that she is unable to deal with innovative but malfunctioning artifacts – a situation that occurs often during a design phase when an early prototype performs badly or not at all. Vermaas 2003: 285. In response, Preston argues that intentionalist theories, including the one by Vermaas and Houkes, cannot distinguish between proper and accidental functions. See Preston 2003: 601–612

75 Preston 1998: 244-245

System

In order to explain how a designer can create a functional prototype, some philosophers have tried to combine the etiological theory with a notion of system functions. The concept of system function is often associated with the name of Cummins but the roots of the idea actually extend back to Aristotle. In *Eudemian Ethics*, he emphasizes that the tool is inseparable from the craft that uses it; both the tool and the craft exist for the sake of its work or its activity.[76] Without the craft, the tool would not be a tool; without the work, the craft would not be craft. Later, Martin Heidegger would talk about the totality of equipment in which a piece of equipment only becomes what it is: one such system is constituted by »inkstand, pen, ink, paper, blotting pad, table, lamp, furniture, windows, doors, rooms.«[77]

To consider an architectural example, we can say that a flying buttress in a Gothic cathedral has the function of directing the lateral forces to the ground. Of course, this is only a partial description. The lateral forces could be resisted by massive walls as in Romanesque buildings or reduced with vaulting shaped in a catenary curve as in Gaudi's designs. Moreover, the Gothic constructional system must be seen as performing a role in a yet larger system whereby large windows become a priority, perhaps justified on theological grounds. Just like we can analyze a part of a church in the context of the building, we can situate the church in the larger urban context – claiming for example that the church is the heart of the city, just like the marketplace is the belly and the duke's castle the head, as in Francesco di Giorgio Martini's famous drawing.

In this way of thinking, the system is co-constituted with its functioning elements: while an element isolated from the system has no function (and is not an element), the system has no function (and does not even constitute a system) if one essential element is missing. In a word, the whole is contained in each and every one of its parts, almost in the way in which mathematicians used to say that theorems are contained in the axioms or the way in which Kant, talking about the analytic judgment, says that the predicate is contained in the subject. As regards natural organisms, including the human being, we do not usually expect that the system has any particular function. Thus, a person might have a function in society (one person might be an architect, another could be a builder), but society itself has no function to fulfill. Ultimately, the same will be true of technical artifacts as well: there is no *causa sui* to terminate the chain of purposes. However, this creates a problem: since the functionality of the elements depends on their status as means to an end, they lose their function if the end is not functional in itself. At best, we are left with *Zweckmässigkeit ohne Zweck*.

Another problem is that we can always propose an arbitrary number of systems for any element at any level of analysis. Imagine a mechanical water pump. One might assume that its function is

1. *to make underground water available.*
We could, however, also propose other teleological explanations in terms of functions. Thus, we could propose that the pump exists in order 2. *to make a profit for the manufacturer,* 3. *to make it possible to occupy otherwise waterless and thus inhabitable regions,* or 4. *to make a rhythmical sound.*

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76 Aristotle, Ethica Eudemia 1242a

77 Heidegger 1962: 97; ld. 1967: 68: »Zeug ist seiner Zeughaftigkeit entsprechend immer aus der Zugehörigkeit zu anderem Zeug: Schreibzeug, Feder, Tinte, Papier, Unterlage, Tisch, Lampe, Möbel, Fenster, Türen, Zimmer.«

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Each one of the explanations (out of an infinite number of alternatives) presupposes many additional conditions, and the pump is grouped together with other things as part of a functionally individuated structure. In the description 1, the pump belongs together with water pipes, faucets and the like, 2 with everything else that affects the balance of the company, 3 with other measures for territorial expansion and invasion, 4 with musical instruments. One could propose that 4 is implausible, as the pump does not work particularly well as a musical instrument but here we would have to evaluate aesthetic properties instead of describing something in a value-free way. Luigi Russolo might well have insisted that there is no music more beautiful than the thumping rhythm of a water-pump.

In the list above, the motive 3 is contingent upon 1 in that if a pump does not succeed in bringing water up, it will not help in occupying an arid region. Furthermore, 2 could be expanded to cover not only the interests of the manufacturer but any human agent: at least in the Enlightenment vision of society, all people are ultimately concerned with the general economy of their actions. From this point of view, we might subsume all the others under this function. However, not everything that people do is efficient in a narrow sense: a society may value some kinds of excess and have a taboo for some economical uses. Jeremy Bentham undermined one widespread taboo in proposing, in his posthumous pamphlet, *Auto-Icon, or Farther Uses of the Dead to the Living*, that human corpses be preserved and weatherproofed with resin and gum so that in the future »may every man be his own statue.«[78] In his will he decreed that he should become the first Auto-Icon, which duly happened, although the process ran into difficulties with an unfreezeable oil oozing out of Bentham's brain. Utilitarian philosopher James Mill (father of John Stuart Mill) suggested this strange liquid might be used to oil chronometers in high latitudes, but his proposal was criticized by a friend of Bentham's, novelist Thomas Love Peacock, and eventually rejected. Peacock explained:

> »The less you say about that, Mill, the better it will be for you; because if the fact once becomes known, just as we see now in the newspapers that a fine bear is to be killed for his grease, we shall be having advertisements to the effect that a fine philosopher is to be killed for his oil.«[79]

78 Bentham 1995: 17

79 Grant Duff 1897 [1953]: 60

Structure

Just like the water pump – or the parts of a philosopher's body – could be used for many different purposes, any physical thing has an infinite number of potential uses. Some uses are generic; others make specific demands on the structure and material of the object. While the Renault engine of Sebastian Vettel's *Kinky Kylie* has all that it takes to be a counterweight in a small elevator, a dumb piece of metal weighing the same (about 95 kg) would do the same for a lot less money than the 200,000 € motor that Renault charges. By contrast, few of the other potential counterweights could ever propel a F1 racecar into victory. Physical things may also have functions that are unrelated to their intrinsic physical features. Didi Mateschitz may pay for the new Renault motor with his credit card but the card does not have this economic function because of its material, weight or shape. Credit cards do what they do because of contingent intersubjective conventions; hence, they are examples of what Searle calls status functions. Some skeuomorphs, such as the imitation wood on the

side of a station wagon, also have status functions: through their (possibly insincere) representation of wealth, they may have a few similar effects as the possession of a lot of money.[80]

Closer to architecture, Searle distinguishes between a wall that physically prevents people from crossing a boundary, and a line that only marks a boundary. The line may also prevent people from crossing over if it is recognized as articulating a territory, but it achieves this by virtue of its symbolic status rather than the intrinsic physical properties of the line.[81]

In the absence of intentional agents, the line would not have a function, proper or otherwise, for function requires both purpose and an appropriate structure: an artifact has a function when someone intends it to have certain effects and it has the capacity to produce such effects. Depending on the context and the desired effects, radically different kinds of properties may be required of the structure. For a child, a broom may function as a horse if it makes a kind of riding possible, but a jockey could not win a derby by riding a broom.

Proper function and malfunction

Our decision to use a particular thing for a certain purpose depends on its formal and material properties, its relation to other things, as well our interests. Donald Trump might well choose to light his cigar with a 100 $ bill if the inconvenience for him of looking for another means would exceed that monetary value. Non-millionaires would normally save the banknote because it can do several other things if left intact.[82] In such an optimization process, we identify the function of a thing so that its value is maximized within a containing system that represents the sum of all activities desired by an agent. An agent with different interests would identify different natural functions. A termite would see the dollar bill as (desirable) fodder, not as a means to buy much more or better food. The function of an artifact is dependent on a conception of a form of life.

In the case of architecture, it is striking that different uses have to be weighted against each other. The decision to erect a church on a particular site may result in there being neither place nor money for a building with another function. Moreover, functions have different implications for authorized users and other people: a house offers privacy to the inhabitant by preventing the access of others.

From a user's point of view, the assignment of function represents a cost-benefit optimization process. To paraphrase Carl Menger's theory of value, function is nothing inherent in an artifact; the assignment of a function to an artifact is a judgment we make about its role in the maintenance of our lives and well-being.[83] We choose to use a particular object for a specific purpose when it is adequate to get the job done without impairing other things that we also want to do. To be functional, a thing has to produce the intended effect efficiently because excessive expenditure would delimit our other options. The function for which a particular artifact is better suited than relevant alternatives may be called its proper function.[84]

From a designer's point of view, the implicit claim of every design is to improve that which from a relevant perspective is perceived to be the state of affairs

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80 A station wagon with wood panels on the sides, or a ›woodie‹, recalls an old technology applied in ›depot hacks‹, cheap trucks used at railway stations for hackwork of luggage and petty shipments. Later, they were upgraded to ›station wagons‹ and still later renamed *estate wagons*, suggesting an elevated status.

81 Searle 1995: 39-41

82 There are counter-examples, of course: during the last weeks of the German inflation of 1923, banknotes were burned for heating or used as wallpaper.

83 Cf. Menger 2007: 120-121

84 This idea can be compared with Aristotle's theory. He determines the proper function of an artifact on the basis of its essence and gives exchange as an example of non-specific or non-essential use: »Of everything which we possess there are two uses: both belong to the thing as such, but not in the same manner, for one is the proper, and the other the improper or secondary use of it. For example, a shoe is used to wear, and is used for exchange; both are uses of the shoe.« Aristotle, Politica 1257a 6-10

as a whole. The point is to maximize the overall value, not to solve partial problems fully. This is how Mies can compensate for the limited utilitas of the Farnsworth House with an excess of venustas.

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To give a concrete example, the safety belt was developed as a solution to the problem that many people die in car accidents. Nevertheless, it is clearly far from perfect, as it cannot prevent all such deaths. There is no metaphysical reason why we could not stop all car-related deaths; one way to do that would be not to allow anyone to use a car. A suitably heavy or big safety belt would also be able to make the operation of a car impossible and thus save lives. Such a solution, however, is normally considered unreasonable and maybe ineffective as well, in the sense that alternative forms of transportation might still cause deaths. The assumption is that the advantages of having private cars are so considerable that a *reasonable* number of accidents will be tolerated. Consequently, we would not decide that a particular safety belt design malfunctions if a person wearing it is injured or dies in a car accident. Rather, the realized safety belt design malfunctions if it performs worse than relevant alternative designs would.

The Erasmus bridge in Rotterdam, designed by Ben van Berkel, represents a more architectural kind of malfunction. On November 4, 1996, the main stay cables of the brand new bridge started to vibrate, reaching an amplitude of 70 cm and threatening a collapse of the whole structure. The vibrations had been induced by water brought into the cables by wind and rain. After a year of full-scale testing of prototypes, hydraulic dampers were installed between the cables and the bridge deck; since then, the vibrations have been unremarkable. It was possible to correct this mistake since the principle of a cable-stayed bascule bridge works for the spans and loads in question, as other tokens of the same type demonstrate. Since the phenomenon of rain and wind induced vibration was not known at the time when the bridge was designed, one cannot accuse van Berkel of having made a mistake. The malfunction of an artifact is often the result of such unforeseeable problems or random accidents. By contrast, we would not talk about malfunction when an alleged perpetuum mobile stops running; rather we would say that the artifact is not a perpetuum mobile at all. In this case, there is no possibility of optimization for the concept for the design has no chance of working.

Typically, ›malfunction‹ suggest an unexpected failing of the structure. If the problem is detectable in the concept for the structure, we would normally not speak of a malfunctioning artifact but a bad design. If the problem results from the actions of the user – if I spill water into my toaster, causing it to short-circuit, for example – we would talk about misuse rather than malfunction.

Constitution

According to Peter Kroes and Anthonie Meijers, technical artifacts are hybrid objects that can only be described adequately by combining physical and intentional conceptualisations of the world. As physical things, artifacts have material and structural properties that are involved in how they function; as intentional objects, they are part of a system of purposes, reasons and goals.[85]
 Baker agrees with Kroes and Meijers, describing artifacts as intention-dependent objects.
What needs to be stressed is that natural organisms may not be intention-

85 Kroes 2006: 1–4

independent either, if understood as conceptually separate. Rather, they seem to display a similar hybridity, a combination of intrinsic or real and relative or cultural contingent properties.

Even if we accepted the realist thesis that there is a mind-independent world out there, it obviously does not follow that such a world would break down to mind-independent objects. The primary matter, the irreducible simples that constitute the material world, needs to be articulated in some way that is contingent upon culture. Pliny informs us that when Hannibal brought the first elephants to Italy, they were called (Lucanian) ›oxen‹ whereas in Africa, elephants were called ›bears‹, a category that also included lions and other dangerous animals.[86] From our perspective, these categorizations may seem to confuse the proper border lines, but there is no reason to assume that our linguistic practices would better capture the essences of things.

In his paper, *No Identification without Evaluation*, Eddy M. Zemach argues that not only the assignment of functions but also the entire partitioning of the world is dependent on our interests. Speaking of bovine animals, the English language distinguishes between cows and bulls, oxen and steer: are they different things or the same? Gelding changes the identity of a bull but not that of a cat, for example, for a castrated cat performs the same functions as before but an ox is valuable for other reasons than a bull or a cow. Hence, we give them different names and different identities. In a restaurant the functions of transportation and procreation cease and other interest take their place. Consequently, all meat of a Bos taurus is called beef, independently of gender or gelding. The concept of ›beef‹ is relevant for nutritional or culinary interests while ›cow‹, ›steer‹, ›ox‹ and ›bull‹ figure in the general economy of a farm.[87] In Zemach's view, the individuation of things is value-bound in that objects of thought are constituted in relation to particular interests; those aspects of things that do not affect our interests tend to remain in the background. It is not only that we value pearls more than mice; there are pearls and there are mice because of how we value the functions that they have in our life.

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86 Pliny the Elder, VIII, vi, 16

87 Zemach 1986: 239-251

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