

George Kubler and the Biological Metaphor of Art

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*George Kubler was one of the most important art historians of the twentieth century who is especially relevant today mainly for shifting the emphasis from high art to what is now known as ‘visual culture’ and for being the first genuinely global art historian. But what he has been most widely known for is the rejection of the biological metaphor of art—the general idea that artistic styles and movements grow, flower and then wither away. I argue that Kubler did not in fact reject the biological metaphor of art but rather replaced a pre-Darwinian biological metaphor with a post-Darwinian one which bears remarkable similarities to Ernst Mayr’s concept of population thinking, developed at the same time that Kubler wrote *The Shape of Time*. Importantly, taking Kubler’s post-Darwinian biological metaphor seriously can help us to understand his distinctive art-historical explanatory scheme.*

1. Introduction

George Kubler’s *The Shape of Time* is considered to be one of the most important books of twentieth-century art history. And not just for historical reasons. Of all the art historians of the twentieth century, the one who is most relevant for the present debates in art history is not Wofflin or Gombrich or Panofsky—it is Kubler.

The reason for this is threefold. First, Kubler was the first art historian who consistently broadened the scope of art-historical research from objects that are or were at some point considered to be art to a much more universal domain that is known today as ‘visual culture’. The general idea is that when it comes to the study of historical changes in style and visual sensibility, we should not restrict our analysis to paintings exhibited in select art museums but also pay attention to objects that are not quite museum materials, including playing cards, commercial advertising or doodles. Kubler very explicitly downplays ‘art’ in ‘art history’. Art history for him is the history of man-made objects (some of which some people consider art). And this is exactly the attitude of recent studies of ‘visual culture’.¹

Second, Kubler is the first genuinely global art historian. His theoretical framework, as we shall see, does not privilege European or Western art and, even more strikingly, most of his examples are taken from non-Western or non-European art. (It helps that Kubler’s narrower specialization was Central American art.) This resonates with the new global

1 M. Sturken and L. Cartwright, *Practices of Looking: An Introduction to Visual Culture* (Oxford: OUP, 2001). James Elkins, *Visual Studies: A Skeptical Introduction* (New York: Routledge, 2003). Whitney Davis, *A General Theory of Visual Culture* (Princeton: Princeton University Press, 2011).

art history movement which aims to question the centrality of Western and European art.²

Third, the new post-formalist movement in art history explicitly returns to George Kubler's work as its foundation. Art historians like David Summers and Whitney Davis engage closely with Kubler's arguments and they take on so many basic premises of Kubler's approach (for example on the mutual interaction between the history of the formal properties of objects and the history of vision) that they might as well be called post-Kublerian (and not post-formalist).³

This paper is about what is probably the most widely known feature of Kubler's book *The Shape of Time*. It is Kubler's attack on the biological metaphor of art and style—the general idea that artistic styles and movements grow, flower and then wither away. I argue that Kubler did not in fact reject the biological metaphor of art, but rather replaced a pre-Darwinian biological metaphor with a post-Darwinian one which bears remarkable similarities with Ernst Mayr's concept of population thinking, developed at the same time that Kubler wrote *The Shape of Time*. Importantly, taking Kubler's post-Darwinian biological metaphor seriously can help us to understand his distinctive art-historical explanatory scheme.

2. The Biological Metaphor of Art

The most salient point that Kubler's *The Shape of Time* makes is that we should flat out reject the biological metaphor of art and style. It is the most salient because Kubler starts the book with it,⁴ and then returns to it at regular intervals throughout the book.⁵ This is also the most self-explanatory point Kubler makes, making it much easier to relate to than his complex argument about successions and series.

But what is this biological metaphor and what is wrong with it? Kubler says that 'the conventional metaphor used to describe th[e] visible past are mainly biological. We speak without hesitation of the "birth of art," or the "life of a style", and the "death of a school", of "flowering", "maturity", and "fading" when we describe the powers of an artist'.⁶

So the general idea is that, say, Renaissance painting started blossoming in the thirteenth century in northern Italy and then was in full bloom in the fifteenth century in Italy and the Low Countries and then quickly withered away at the beginning of the sixteenth century. Such biological metaphors were used widely in the nineteenth and the first half of the twentieth century, probably most prominently by none other than Henri Focillon who was Kubler's teacher and mentor. His *Vie des Formes* (1934)⁷ is one lengthy elaboration of this biological metaphor (as

2 James Elkins (ed.), *Is Art History Global?* (New York: Routledge, 2006). Jonathan Harris (ed.), *Globalization and Contemporary Art* (Oxford: Wiley-Blackwell, 2001). Keith Moxey, 'Is Modernity Multiple?', in his *Visual Time: The Image in History* (Durham: Duke University Press, 2013).

3 See especially David Summers, *Real Spaces* (London: Phaidon, 2003); Whitney Davis, 'World Series: The Unruly Orders of World Art History', *Third Text* 25 (2011), 493–501; Whitney Davis, *A General Theory of Visual Culture* (Princeton: Princeton University Press, 2011).

4 George Kubler, *The Shape of Time* (New Haven: Yale University Press, 1962), 5–9.

5 For example, *ibid.*, 40, 44.

6 *Ibid.*, 5.

7 Henri Focillon, *Vie des Formes* (Paris : E. Leroux, 1934).

Kubler acknowledges).⁸ But similar metaphors can be spotted in almost all art-historical writings in the nineteenth and the first half of the twentieth century, with Wölfflin's *Principles of Art History* and Gombrich's *The Story of Art* as two especially explicit examples.⁹

What is Kubler's problem with this biological metaphor? He is not particularly clear about this, but we can make out three distinct reasons why he rejects it.

The first one is about the uniqueness of every object, which the biological metaphor fails to appreciate—as it considers any two objects of the same growth period of the same style to be more or less interchangeable. As he says, 'this [biological] metaphor recognized the recurrence of certain kinds of events, and it offered at least a provisional explanation of them, instead of treating each event as an unprecedented, never-to-be-repeated unicum'.¹⁰

The second, somewhat related reason is that the biological metaphor fails to appreciate the complexity of historical processes: it homogenizes the diverse historical processes that happen during one growth phase. As he says, 'The biological metaphor of style as a sequence of life-stages was historically misleading, for it bestowed upon the flux of events the shapes and the behavior of organisms'.¹¹ And even more explicitly: 'By the biological metaphor of art and history, style is the species, and historical styles are its taxonomic varieties'.¹²

The third, very much unrelated reason is that history is teleological, whereas biology is not. As he says, 'Purpose has no place in biology, but history has no meaning without it'.¹³ This claim may now raise eyebrows as the role and usefulness of teleology in history it has been questioned in the last couple of decades.¹⁴ Here is a more helpful statement:

'Because ... modes of biological description cannot be made to account for purpose, the historian working with biological ideas avoided the principal aim of history, which usually has been to identify and reconstruct the particular problem to which any action or thing must correspond as a solution. Sometimes the problem is a rational one, and sometimes it is an artistic one: we always may be sure that every man-made thing arises from a problem as a purposeful solution'.¹⁵

What metaphors should art historians use then if biological metaphors are misleading and useless? Kubler somewhat surprisingly proposes physical metaphors: 'The language of electrodynamics might have suited us better than the language of botany; and Michael Faraday might have been a better mentor than Linnaeus for the study of material culture'.¹⁶

8 George Kubler, *The Shape of Time* (New Haven: Yale University Press, 1962), 5–9.

9 Heinrich Wölfflin, *Principles of Art History: The Problem of the Development of Style in Later Art*, trans. M. G. Hottinger (New York: Dover Publications, 1950 [1932]); Ernst Gombrich, *Art and Illusion: A Study in the Psychology of Pictorial Representation* (Princeton, NJ: Princeton University Press, 1972 [1960]).

10 George Kubler, *The Shape of Time* (New Haven: Yale University Press, 1962), 5–9.

11 *Ibid.*, 8.

12 *Ibid.*, 9.

13 *Ibid.*, 8.

14 See especially H. White, *Metahistory: The Historical Imagination in Nineteenth-Century Europe* (Baltimore, MD: Johns Hopkins University Press, 1973); see also, Bence Nanay, 'Internal vs. External History', *Philosophy* 92 (2017), 207–230 for discussion.

15 Kubler, *The Shape of Time*, 8.

16 *Ibid.*, 9.

This is very confusing as none of Kubler's three problems with biological metaphors is resolved if we use physical metaphors. Physics is not more about the unique particular than biology (and, as we have seen, according to some, much less so). Physics also papers over local complexities and variations. Finally, there is much less teleology in physics than in biology. (In biology there is at least 'apparent teleology' in natural adaptations.) So it is not clear how much weight could be or needs to be given to these fleeting and somewhat flippant observations about physical metaphors. As we shall see, Kubler's own positive account has very little to do with any kind of physical metaphor. He does often use mathematical metaphors (especially from graph theory¹⁷) in order to explicate the concept of series. But the general structure of the argument of *The Shape of Time* has a lot to do with biological explanations of a certain kind.

In the rest of this paper, I will argue that Kubler did not in fact reject the biological metaphors. In fact, much of his book is based on a biological metaphor of variation and selection. Rather, he replaced a pre-Darwinian biological metaphor (of growth) with a post-Darwinian biological metaphor of variation and selection. And, at exactly the same time, the biologist and philosopher of biology Ernst Mayr was making a surprisingly similar move. I introduce Ernst Mayr's concept of 'population thinking' in the next section before returning to Kubler's positive account of the explanatory scheme of art history.

3. Population Thinking

Ernst Mayr was one of the founding fathers of modern evolutionary biology. He is one of the main figures of the so-called 'Modern Evolutionary Synthesis', the move of combining Darwin's theory of natural selection with modern genetics. He is also a very philosophical biologist, who wrote articles and even books that are much closer to philosophy of biology than to biology proper.

Like Kubler (see his first argument), Mayr took uniqueness to be a very important aspect of human life. But he argued that uniqueness is just as important in biology. As he says: 'The more I study evolution, the more I am impressed by the uniqueness, by the unpredictability, and by the unrepeatability of evolutionary events.'¹⁸

Mayr considered his own main philosophical contribution to biology to be the concept of 'population thinking'. And, as the author of the first major work on the history of evolutionary thought, he also took the articulation of 'population thinking' to be Darwin's most important intellectual achievement.

17 See, for example, Kubler, *The Shape of Time*, 33–39.

18 Ernst Mayr, 'Where are We?', in his *Evolution and the Diversity of Life* (Cambridge, MA: Harvard University Press, 1976 [1959]), 317. For similar views see: Ernst Mayr, 'Typological versus Population Thinking', in B. J. Meggers (ed.), *Evolution and Anthropology* (Washington, DC: Anthropological Society of America, 1994 [1959]), 409–412; D. Hull, 'On Human Nature', *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association* 2 (1986), 3–13; Peter Godfrey-Smith, *Darwinian Populations and Natural Selection* (Oxford: OUP, 2009); Alex Rosenberg, 'Coefficients, Effects and Genic Selection', *Philosophy of Science* 50 (1983), 332–338; Bence Nanay, 'Population Thinking as Trope Nominalism', *Synthese* 177 (2010), 91–109; Bence Nanay, 'A Modal Theory of Function', *Journal of Philosophy* 107 (2010), 412–431.

So what is population thinking? Here is Mayr's characterization of population thinking from 1959, the year Kubler was working on *The Shape of Time*:

Individuals, or any kind of organic entities, form populations of which we can determine only the arithmetic mean and the statistics of variation. Averages are merely statistical abstractions; only the individuals of which the populations are composed have reality.¹⁹

Mayr contrasts population thinking with typological thinking, according to which 'there are a limited number of fixed, unchangeable "ideas" underlying the observed variability, with the *eidōs* (idea) being the only thing that is fixed and real, while the observed variability has no ... reality.'²⁰ The contrast Mayr makes is a very sharp one: population thinking and typological thinking are exclusive of each other.²¹

According to Mayr, Darwin's major achievement was not the claim that humans evolved from other animals. Nor is it the claim about the importance of selection in this process. Mayr argues at length (over 800+ pages) that these ideas were there before Darwin's *The Origin of Species*. What was not there is the general metaphysical framework of population thinking.

There are some debates in philosophy of biology about just what this metaphysical framework amounts to, but the core claim is that biology is about particulars, not types.²² And the most important biological explanatory scheme (namely, natural selection) is also about particulars, not types.

As a result, instead of talking about the heredity, variation and fitness of the genotypes and phenotypes, Mayr's account of natural selection has nothing to do with any types, be them genotypes or phenotypes. Here is the way he characterizes natural selection, something that will be very important for understanding Kubler's positive account: 'natural selection is actually a two-step process, the first one consisting of the production of genetically different individuals (variation), while the survival and reproductive success of these individuals is determined in the second step, the actual selection process.'²³

This way of thinking about natural selection as a two-step causal process is all about particulars: singular causal claims about the production and reproductive success of particulars are what serve in the *explanans* of selective explanations. The first step, 'the production of genetically different individuals', is clearly a singular causal claim that refers to particular events about particular individuals. The second step, which determines 'the

19 Mayr, 'Typological versus Population Thinking', 326.

20 Ibid.

21 Ibid., 326–327.

22 Elliott Sober, 'Evolution, Population Thinking, and Essentialism', *Philosophy of Science* 47 (1980), 350–383; Paul Griffiths, 'Squaring the Circle: Natural Kinds with Historical Essences', in R. Wilson (ed.), *Species: New Interdisciplinary Essays* (Cambridge, MA: MIT Press, 1999), 209–228; Nanay, 'Population Thinking as Trope Nominalism'.

23 Ernst Mayr, *One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought* (Cambridge, MA: Harvard University Press, 1991), 68. See also Ernst Mayr, *The Growth of Biological Thought. Diversity, Evolution, and Inheritance* (Cambridge, MA: Harvard University Press, 1982), 519–520.

survival and reproductive success of these individuals' is also a singular causal claim that refers to particular events.²⁴

David Hull, a philosopher of biology working very much within the population thinking framework, calls these two steps replication and interaction. He defines selection as: 'The repeated cycles of replication and environmental interaction so structured that environmental interaction causes replication to be differential.'²⁵ The unit of interaction ('interactor'), on the other hand, is defined as the 'entity that interacts as a cohesive whole with its environment in such a way that this interaction causes replication to be differential'.²⁶ I will call this version of the two-step model of selection the 'replicator-interactor' account as it identifies replication with the copying of an entity, the replicator.

In the last two decades or so, both philosophers and biologists have argued against the replicator-interactor account. The main problem is that there are ways of transmitting information (extragenetic inheritance, cultural transmission) that do not count as the copying of replicators but that are (given other conditions) sufficient for selection.²⁷

It is important that these problems are problems for the replicator-interactor account and not for the two-step model of selection in general. Mayr's claim is that selection consists of repeated cycles of replication and interaction. It is an additional requirement that replication should be thought of as the copying of an entity—namely, the replicator. There are versions of the more general two-step model of selection that avoid these objections. We could conceive of replication as the copying of property-instances.²⁸ Or we could beef up the concept of replication, as James Griesemer does with his notion of reproduction.²⁹ Reproduction, according to Griesemer, is 'multiplication with material overlap of propagules with developmental capacity'.³⁰ Both of these accounts, just like the original Mayr/Hull account, clearly use singular causal claims as the *explanans* of selective explanations, thereby doing justice to the uniqueness of the biological domain. The details of these accounts of selection will play an important role in Section 5.

24 Mayr, *One Long Argument*, 68.

25 D. Hull, R. E. Langman and S. S. Glenn, 'A General Account of Selection: Biology, Immunology and Behavior', *Behavioral and Brain Sciences* 24 (2001), 511–528, at 513. See also D. Hull, *Science as Process* (Chicago: Chicago University Press, 1988), 408, Peter Godfrey-Smith, 'The Replicator in Retrospect', *Biology and Philosophy* 15 (2000), 403–423, and Bence Nanay, 'The Return of the Replicator: What is Philosophically Significant in a General Account of Replication and Selection?', *Biology and Philosophy* 17 (2002), 109–121, on the concept of replication and interaction.

26 Hull, *Science as Process*, 408.

27 S. Okasha, *Evolution and the Levels of Selection* (Oxford: OUP, 2007), 15–16. Peter Godfrey-Smith, 'Conditions for Evolution by Natural Selection', *Journal of Philosophy* 104 (2007), 489–516, at 515. Eva Jablonka and Marion J. Lamb, *Epigenetic Inheritance and Evolution: The Lamarckian Dimension* (Oxford: OUP, 1995).

28 Bence Nanay, 'Replication without Replicators', *Synthese* 179 (2011), 455–477. See also Nanay, 'The Return of the Replicator', 113.

29 James Griesemer, 'The Units of Evolutionary Transition', *Selection* 1 (2000), 67–80.

30 *Ibid.*, 74–75.

4. Kubler's Population Thinking

The similarities between Mayr's population thinking and Kubler's conceptual framework for describing art-historical changes should be clear. In fact, all of Kubler's three reasons for dismissing the biological metaphors of art and style are arguments that could be construed as the population thinker's argument against typological thinking. When Kubler rejects the biological metaphor what he really rejects is typological thinking.

Remember Kubler's first argument: he emphasized how biology cannot capture the uniqueness of art-historical events. And this is exactly the main complaint of the population thinker against typological thinking: biology is about particulars, not types. Kubler's insistence on 'treating each event as an unprecedented, never-to-be-repeated unicum'³¹ is very similar to Mayr's insistence on 'the unrepeatability of evolutionary events'.³² Both attack typological thinking in biology.

There is a further wrinkle here. Neither Mayr nor Kubler are opposed to using categories. One of Mayr's major contributions to evolutionary theory was his theory of species—very much a biological category. And in order to accommodate this in the framework of his population thinking, we need to interpret his population thinking as a claim about the priority of particulars over categories, not as a downright rejection of categories altogether.³³ And Kubler very explicitly considers the problem of sorting particulars into 'classes, types, and categories' in his most explicit statement on the matter:

since no two things or events can occupy the same coordinates of space and time, every act differs from its predecessors and successors. ... Every act is an invention. Yet the entire organization of thought and language denies this simple affirmation of non-identity. We can grasp the universe only by simplifying it with ideas of identity by classes, types, and categories and by rearranging the infinite continuation of non-identical events into a finite system of similitudes. It is in the nature of being that no event ever repeats, but it is in the nature of thought that we understand events only by the identities we imagine among them.³⁴

What is supposed to be the similarity between Kubler's account and Mayr's population thinking is not the rejection of all categories. But, rather, the explanatory priority of unique particulars over abstract categories. The categories should be formed on the basis of the particulars and particulars should not be considered to be mere exemplars of the categories.

Kubler's second argument was that the biological metaphor homogenizes the complex and diverse art-historical events. When he says that 'By the biological metaphor of art and history, style is the species, and historical styles are its taxonomic varieties', he describes the essence of typological thinking, where biological categories come neatly packaged into species, subspecies, taxa, and so on.³⁵ The population thinker denies this and takes

31 Kubler, *The Shape of Time*, 9.

32 Mayr, 'Where are We?', 317.

33 See Nanay, 'Population Thinking as Trope Nominalism'.

34 Kubler, *The Shape of Time*, 67; see also 96–97.

35 Kubler, *The Shape of Time*, 9.

the basic unit of biology the messy, constantly changing biological particulars, which can be grouped, somewhat randomly into taxa, subspecies, and so on.

Kubler's third argument from teleology is a bit less straightforward, both in itself and in its relation to population thinking. As we have seen, his main complaint is that biology cannot capture the teleology of historical processes. But this teleology should not be understood in some kind of Hegelian manner, where all events of history have a telos and they all work on achieving this telos.

Instead, Kubler's starting point is that historical explanations aim 'to identify and reconstruct the particular problem to which any action or thing must correspond as a solution'.³⁶ This thought—namely, that art history is about discovering what problems art objects provided the solution to—is often associated with Gombrich and it does not presuppose a Hegelian or a whiggish vision of history.

But, on the face of it, it does present a problem to any use of any biological metaphor—not just to typological thinking, but also to population thinking. Artists come up with solutions to an art-historical problem because they are aware of the problem, they think about it and they try to solve it. But the vast majority of biological entities are not capable of any of these processes. How can we take the biological metaphor seriously, then?

Here it is important to note that probably the most important task of evolutionary biology is to explain adaptation in terms of selection. So the aim is to explain why there is a match between the organism and its environment. Why is it that the colour of the moth's wings matches exactly the colour of the bark of the tree it lives on? This explanation is very similar to the problem-solution kind of explanation Kubler identifies as the primary task of art history. Kubler says that art history aims 'to identify and reconstruct the particular problem to which any action or thing must correspond as a solution'.³⁷ But we can say that at least one aim of evolutionary biology is to identify and reconstruct the particular environment to which features of an organism correspond as an adaptation.³⁸

There is still a difference: the moth's wings do not think about the environment and try to come up with creative solutions as to how to blend in. But part of the novelty of Kubler's entire framework (and a major advantage over the Gombrichian version of the problem-solution vision of art history) is exactly to emphasize that artistic production does not have to be such a highly intellectualized and deliberative process. Often the tweaks an artist makes on a well-established mode of artistic production has little to do with explicitly thinking about the problem or deliberately trying to come up with a solution. This does not mean that it is as like the changes in the colour of the moth.

Kubler is very explicit that the artist's choices reflect conscious awareness of the problem at hand. He characterizes an artistic problem as 'a *conscious* problem requiring the serious *attention* of many persons for its successful resolution. There are no linked solutions

36 Ibid., 8.

37 Ibid.

38 It should be emphasized that not all biological and not even all selectionist explanations would be such 'adaptive explanations' if we want to avoid the well-known charge of adaptationism, given that not all biological features are adaptations to the environment; some of them, for example, are by-products of a different adaptation process.

without there having been a corresponding problem. There is no problem where there is no *awareness*'.³⁹ That is an undeniable difference between the artistic and biological cases.

But even though the artist's problem-solving involves awareness of the problem, whereas the moth's does not, a crucial similarity remains: the artist's behaviour is explained by a problem. And the changes in the colour of the moth's wings is explained by the adaptation problem. The artist's problem solving is somewhere in between the changes in the colour of the moth's wings and the scientist's problem-solving. Unlike the former, it needs to involve a degree of awareness of the problem. But unlike the latter, it does not have to be an intellectual mental process of deliberately trying to come up with a solution.

In short, Kubler's third argument is also consistent with the population thinking framework. His three arguments against the biological metaphor of art and style are really arguments against typological thinking.

And, even more suggestively, a distinction Kubler makes between a 'prime trait' and the whole object it is a trait shows remarkable resemblance to the replication/interaction distinction I discussed in Section 3. Here is what Kubler says:

Our interest therefore centers upon minute portions of things rather than upon the whole mosaic of traits that constitutes any object. The effect of the mutant fraction, or prime trait, is dynamic in provoking change while that of the whole object is simply exemplary, exciting feelings of approval or dislike more than any active study of new possibilities.⁴⁰

The 'prime trait' (which Kubler even characterizes as 'mutant' would be the equivalent of the replicator (or, even more so, the replicating property or trait), whereas the 'whole object' amounts to the interactor. Just how consistently Kubler applies this distinction and what version of the replication vs. interaction distinction within the philosophy of biology debates the distinction corresponds to is something I cannot discuss more thoroughly in this paper, but it is a strong indication of the similarities between Kubler's theoretical framework and Mayr's population thinking. But we can make an even stronger claim. Kubler's positive account of art-historical changes, which centres on the concept of the 'rule of series' is also a fairly straightforward version of population thinking.

5. Kubler's Positive Account

The key concept of Kubler's positive account of art-historical changes is that of the 'series'. Art history is about series of man-made objects. These series are sequences of man-made objects where each object is the 'replica' of the previous object. These replicas are not faithful copies. As Kubler emphasizes, 'Each replica differs slightly from all the preceding ones'.⁴¹ Here is Kubler's somewhat dense explanation of how these series change:

39 Ibid., 38, all emphasis mine.

40 Ibid., 40–41.

41 Ibid., 43.

Every succession may be stated in the following propositions: (1) in the course of an irreversible finite series the use of any position reduces the number of remaining positions; (2) each position in a series afford only a limited number of possibilities of action; (3) the choice of an action commits the corresponding position; (4) taking a position both defines and reduces the range of possibilities in the succeeding position. Stated differently, every new form limits the succeeding innovations in the same series.⁴²

Whitney Davis, one of the contemporary art historians who explicitly acknowledges his debt to Kubler's model unifies these four claims in one sentence: 'In an irreversible finite series, taking one position defines and reduces the formal motions that are possible in succeeding positions'.⁴³ But how does this work?

Let us start with an object, A. B, B* and B** are replicas of A. C, C* and C** are replicas of B. Being acquainted with A, an artist produces B, B* and B**. The fact that this artist was acquainted with A explains why B, B* and B**, although different, all bear some resemblance to A. Some of these objects may have disappeared and another artist, some time later, who is only acquainted with B, will produce C, C* and C**. As before, C, C* and C** are all different, but they all resemble B in some respect and the fact that this second artist has encountered B explains why C, C* and C** resembles B.

Crucially, the fact that B* and B** disappeared and it is B that provided the source for future replicas makes C, C* and C** very different from what they would have been if it had been B* that got replicated. This is the sense in which the variations of replicas accumulate—Kubler himself talks about 'accumulated variations'—a key concept of evolutionary biology in the population thinking tradition.⁴⁴

Whitney Davis helpfully compares the Kublerian series to a game of chess, where one move restricts the next move.⁴⁵ There are variations: at each point of the game a number of chess moves are possible. But, depending on what move is made at time T1, the available moves at time T2 will be very different. Davis contrasts this with a game of dice. There are also variations in a game of dice, but one roll at time T1 does not put constraints on what the next roll at T2 is going to be. We have variations both in chess and dice, but we only have cumulative variations in chess.

This explanatory scheme clearly owes a lot to biology, as Kubler himself acknowledges. For example, he talks about mutations giving rise to a series, faintly apologizing for, well, a biological metaphor:

Although biological metaphors are avoided throughout this essay, their occasional use for clarifying a difficult distinction is justified when we are talking about prime objects. A prime object differs from an ordinary object much as the individual bearer of a mutant gene differs from the standard example of that species.⁴⁶

42 Ibid., 54.

43 Davis, 'World Series', 496. See also Davis, *A General Theory of Visual Culture*, 296–297.

44 Kubler, *The Shape of Time*, 43.

45 Davis, 'World Series', 496–498.

46 Kubler, *The Shape of Time*, 40.

And he also talks about speciation, tangentially touching on one of the main problems of the biological subdiscipline of taxonomy: ‘Under most circumstances the prime objects have disappeared into the mass of replicas, where their discovery is most difficult and problematic, akin to the greater difficulty of discovering the first recognizable examples of the biological species.’⁴⁷

But it is helpful to go through how Kubler’s explanatory scheme could be considered to be a step-by-step translation of a straightforward selective explanation in evolutionary biology (of the kind population thinkers talk about). Here is a very simplified example (where I ignore sexual reproduction and limit the traits relevant for selection to only one). The length of the neck of giraffe *x* is 12 feet. She has three offspring, *a*, *b* and *c*. Giraffe *a*’s neck-length is 10 feet, *b*’s is 12 and *c*’s is 14 feet. If the branches are very high up, then *c* is more likely to survive than *a* and *b*. Thus, *c* makes it to the next generation and she has three offspring, *d*, *e* and *f*. As *c*’s neck-length was 14 feet, this will be the trait that gets transmitted to her offspring who will have the neck-length of 12, 14 and 16 feet respectively. Again, *f*, who has the longest neck, is the most likely to survive. And so on. What we have here is a cumulative selection process: changes accumulate. But as this selection process operates on trait tokens, it is not only the frequency of the selected traits that change: the selected traits in one generation will also be different from the ones in the previous generation: *c*’s neck is longer than *x*’s and *f*’s is longer than *c*’s. In the first generation, *x*’s neck-length was 12 feet, in the *n*th generation, the neck-length of the individuals in the population will be close to the height of the lowest branches of the trees in the environment; it will *adapt* to the environment.

As Karen Neander says, in a cumulative selection process ‘the probable outcome of future [rounds of selection] depends on the results of previous [rounds of selection]’.⁴⁸ This is the exact equivalent of the ‘rule of series’, according to which ‘In an irreversible finite series, taking one position defines and reduces the formal motions that are possible in succeeding positions’.⁴⁹

Importantly (especially from the point of view of Kubler’s third argument against the biological metaphor), one of the most important distinctive features of cumulative (as opposed to non-cumulative) selection is that it can explain adaptation: the apparent fit between organism and environment. The cumulative selection for neck-length in the toy example above explains why the neck-length of giraffes living today is what it is.⁵⁰ It posits an environmental or adaptive problem and the current neck-length is the solution to this

47 Ibid., 44.

48 Karen Neander, ‘Explaining Complex Adaptations’, *British Journal for the Philosophy of Science* 46 (1995), 583–587, at 584. Typological thinking has notorious problems with cumulative selection: see Elliott Sober, *The Nature of Selection* (Cambridge, MA: MIT Press, 1984), 99.

49 Davis, ‘World Series’, 496. See also Davis, *A General Theory of Visual Culture*, 296–297.

50 Karen Neander, ‘Pruning the Tree of Life’, *British Journal for the Philosophy of Science* 46 (1995), 59–80. Elliott Sober, ‘Natural Selection and Distributive Explanation’, *British Journal for the Philosophy of Science* 46 (1995), 384–397. Bence Nanay, ‘Can Cumulative Selection Explain Adaptation?’, *Philosophy of Science* 72 (2005), 1099–1112. Bence Nanay, ‘Natural Selection and the Limitations of Environmental Resources’, *Studies in History and Philosophy of Biological and Biomedical Sciences* 41 (2010), 418–419.

problem. Nobody has to think about the problem or try to come up with a solution, least of all the giraffes in question. The solution is provided by the gradual cumulative selection process itself.

Similarly, a Kublerian series will find the solution to a design problem in the same sense. In each step in the series, the more successful (whatever is meant by that in this context—something like, the ones closer to a solution to a problem) replicas will spawn more replicas and the entire series through these cumulative steps of gradual variation will come closer to a solution to the design problem. Biology, at least biology in the tradition of population thinking, can and does talk about ‘purpose’, at least in the sense in which historians do—as solutions fitting problems.

6. Conclusion

I argued that Kubler, who is well-known for attacking the biological metaphor of art and style in fact replaced one biological metaphor (the pre-Darwinian typological thinking) with another biological metaphor (the post-Darwinian population thinking). And taking Kubler’s post-Darwinian biological metaphor seriously can help us to understand his distinctive art-historical explanatory scheme. The fact that Kubler wrote *The Shape of Time* in 1959, exactly when Ernst Mayr wrote his famous paper on population thinking, is worth some archival research about the correspondences of these two thinkers. A fair amount of attention has been given to the relation between Kubler’s work and complexity science as well as cybernetics.⁵¹ My aim was to argue that the relation to biology in general and to population thinking in particular is even more important.

The aim of the comparison between Kubler and Mayr is not of mere historical interest. The population thinking that is in the background in much of Kubler’s reasoning should make us reinterpret some of his more specific claims (like the one about the importance of physics). And the Kublerian population-thinking approach to art history could provide a more fruitful (and less theoretically problematic) theoretical framework for understanding art-historical changes than the recently popular meme theory.⁵²

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51 See Ellen K. Levy (2009), ‘Classifying Kubler: Between the Complexity of Science and Art’, *Art Journal* 68 (2009), 88–98 and Pamela M. Lee, ‘“Ultramoderne”: Or, How George Kubler Stole the Time in Sixties Art’, *Grey Room* 2 (2001), 54, respectively.

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