

GLOBALIZATIO EX-NIHILO? REFLECTIONS ON PRE-MODERN INDIAN OCEAN NAUTICAL SOURCES, SCIENTIFIC GLOBALITY AND TECHNICAL GLOBALISATION

Globalizatio ex nihilo? Reflexões sobre as fontes náuticas premodernas do Oceano Índico, globalidade científica e globalização técnica

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ABSTRACT

My central assertion is that in world history in general, and in particular in history of knowledge, the dynamic process of globalisation presupposes and relies on a fundamental static counterpart for which I use here the word *globality*. To support this contention, I start from an analogy between the genesis of the world, cosmogony, elaborating on philosophical and theological points to draw my analogy. Then I introduce examples from research on history of early modern science, to do with Indian Ocean navigation and the early modern Iberian expansion.

KEYWORDS: Technoscience. Philosophy of history. Globalization.

RESUMO

Minha afirmação central é que na história mundial em geral, e em particular na história do conhecimento, o processo dinâmico de globalização pressupõe e depende de uma contraparte estática fundamental para a qual uso aqui a palavra *globalidade*. Para apoiar essa afirmação, começo com uma analogia entre a gênese do mundo, a cosmogonia, desenvolvendo pontos filosóficos e teológicos para traçar minha analogia. Então, apresento exemplos de pesquisas sobre a história da ciência pré-moderna, a ver com a navegação no Oceano Índico e a expansão ibérica pré-moderna.

PALAVRAS-CHAVE: Tecnociência. Filosofia da história. Globalização.

The following reflections started taking shape in the context of the ERC Project “RUTTER: Making the Earth Global,” based at the Faculty of Sciences of the University of Lisbon¹ It has been my remit to revisit the Classical Arabic nautical literature of the 15th and 16th centuries, and to study them in the context of the contemporaneous Iberian nautical works, in particular the rich, somewhat understudied and impossible to classify *livros de marinharia* (seamanship handbooks) in a wide sense.² During the course of the project, we came into contact rather serendipitously with a new whole family of Arabic nautical literature of later dates, mostly from the early 19th century, where we can appreciate first-hand the results of centuries of technoscientific symbiosis and exchanges between European and Asian mariners. In the following pages I will elaborate on this material, partly from direct readings of the unedited manuscripts, partly from pre-modern Portuguese and Arabic sources. I will be teasing out a rather well-known claim, that what we call globalisation did not come from any sort of historical nothing,³ and then I will explore and try to delineate that initial, or rather pre-initial moment in the development of globalisation. Although my observations and reflections have to do primarily with history of knowledge, with the development of global technoscience as we currently understand it, they will naturally have bearings on globalisation in general.

More specifically, these reflections originated in a conference organised by the University of Alicante, entitled “La génesis de la globalización”.⁴ As I did then, I will capitalise now on the conference title, and develop my argument starting from the word “genesis”, and in particular from its biblical meaning, i.e. the origin of the universe according to the Judeo-Christian cosmogony. As I proceed this way, I beg the reader’s indulgence for what may feel like a rather too philosophical detour.

An important theological and cosmological discussion, which is actually still active in new forms in our time,⁵ is that of primordial matter and the question of creation *ex nihilo*, creating out of nothing. The basic approach follows roughly this line of thought, “If God as

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² Regarding this impossibility and the fruitful inroads towards such classification, see the RUTTER Technical Notes produced by my colleague Luana Giurgevich, 2020, 2021 and 2023.

³ See for example Raj 2016, p. 273.

⁴ It was organized jointly by the Universidad de Alicante, Lisbon’s Centro Interuniversitário de História das Ciências e da Tecnologia (CIUHCT), and the Instituto Juan Andrés, on 22–23 September 2021.

⁵ I refer, for example, to the contemporary speculations of pre-Big Bang cosmological physics, about primordial plasma and the hypothetical proto-matter sometimes called *ylem*.

Creator is a craftsman, a demiurge, as Plato called him in the *Timaeus*, then, like any craftsman, he needs a material for his work. A carpenter does not come along and say, ‘Let there be wood!’, but the wood already exists before he begins the creative process.” Even if God as Creator is not considered a craftsman, there is a legitimate metaphysical question, or rather the classical question that defines the boundary between ontology and metaphysics, “How is it possible to produce something from nothing?” Which inevitably leads us to ask what this primordial *nihil* means, how should it be understood. Is it nothing, absolutely nothing indeed?

The Jewish sages who discussed these questions for centuries, and whose discussions resulted in what we know as the Talmud, propose, among other possible answers, that the raw material of creation was the letters of the alphabet, meaning thereby also the sounds, the phonemes of the divine language.⁶ This, of course, is very reminiscent of the *In principio erat verbum* (“In the beginning was the word”) of the Gospel of John, and it raises new questions: where did this divine language come from? what are these letters made of? and so on.⁷ Now, for the purposes of this article, we can dispense with the details of metaphysics and theology, and retain the idea that before creation there was a “language”, meaning here *something made up of elements* (the plural *elementa* was, in Latin, one of the ways of calling the letters of the alphabet), *something structured and structuring*, because there is no language without grammar. And in saying so, I remember that this very word “grammar” comes directly from the Greek root *gramma*, which means a letter, again. There is indeed a very complex, and almost systematic relation between the various aspects of the fundamental elements of creation as letters, sounds, logical units, graphic units; the same building blocks, sometimes seen from a linguistic-logical-acoustic angle, sometimes from a physical-structural angle. Now, moving forward, and coming back to less dizzying matters, let us do so with this multi-faceted primordial complex in mind—let us go back to the beginning.

Globality and globalisation

I will develop my argument on the basis of the distinction drawn by Jens Bartelson between two concepts that sound similar and are related, but also clearly delimited: globality and globalisation. Bartelson is concerned with issues of socio-politics but since, to

⁶ Detailed references can be found in Acevedo (2020).

⁷ I have had occasion to research this subject extensively under the auspices of the Warburg Institute in London, culminating in the publication of the book cited in the previous note, which may be useful for interested readers.

paraphrase a description from the Spanish Universalist School, “the study of socio-politics is to be furthered by the study of culture and science”,⁸ I will use some of Bartelson’s ideas as a starting point, with some flexibility and a pinch of salt. I shall be drawing mainly from some of the central ideas in his book *Visions of World Community* (2009), and in his article entitled “The Social Construction of Globality” (2010).

Bartelson develops the idea that for the intercultural relations that characterised modernity to be established, and for what has become over time the so-called “international order” to be established, there had to be a substratum. Not just a conceptual substratum, such as the idea, the concept, of a possible world community, but in fact, more concretely, that very common ground or community – in the sense of a shared perception of something common – that Europeans and Asians perceived at the time of the first encounters. This community “not only precedes but also effectively conditions the emergence of our modern, bounded forms of community” (2009, p. ix). In order to clarify his meaning, Bartelson proposes to situate visions of a world community in the context of traditional cosmological doctrines (2010, p. 220-23), and draws attention to the special importance of “cosmological doctrines related to the geographical configuration of our planet” (2009, p. 13).

Here I must digress a little from Bartelson to recall (as an aside) that when we speak of cosmology in a pre-modern context, we are always talking about something inseparable from religious doctrines, and therefore something inevitably interpenetrated with the totality of the culture of origin; something organically related to all dimensions of life, akin to Merleau-Ponty and Certeau’s idea of “anthropological space” (Conley, 2012, p. 36-37). That is to say that when we speak of medieval or ancient cosmology, we always speak also, necessarily, of the “mentalities” or “cosmovisions” that form a natural part of rites, arts and crafts, and also, no doubt, of the most abstract and elaborate scientific theories. That is to say, as demonstrated cogently by Ananda K. Coomaraswamy some decades ago, in pre-modern cultures there is an unbroken continuum between metaphysics and everyday life (1939, p. 381-382). And thus, this perceived “community” of our particular case, the scientific encounter between cultures, must necessarily have had deep and extensive roots within the worldviews of the participants.

Going back to the initial distinction between globality and globalisation, I understand *globality* here as that substratum prior to the intensification of relations between cultures.

⁸ See <https://bit.ly/universalistaespanola> (accessed 12 November 2024).

And I understand *globalisation* as the more or less direct product of this intensification. Globality manifests itself in history as a catalyst, perhaps a ferment, ready to inaugurate and always to some extent ready to set the tone for globalisation. I use the verb “inaugurate” advisedly, because it can be seen that globalisation, as the as yet imperfect, and perhaps always imperfect, unfolding of a world process, is effected *under* the sign of globality. To employ another term used by Sanjay Subrahmaniam, who has analysed and understood in great detail the encounters between empires in the pre-modern era, I am referring to the commensurability between cultures that meet, or perhaps more precisely to the cognitive dimension of such commensurability (2007, p. 34).

Globalisation, it can be said, is a perpetual yearning for globality, and in practice perhaps, sadly, an almost always misguided, corrupted, prostituted quest for globality. But “You must always have Ithaca in mind,/ Arriving there is your destiny,” said Cavafis (2009, p. 66). So, in our search for the meaning of globalisation, it can be of invaluable help to clearly delineate *the first globality*, as the static complement of what will be later – always later and always imperfectly – the dynamics of globalisation.

Practice and theory of globality

In the following paragraphs I will proceed to give some examples to make my approach clearer, but it is evident that we are touching on very broad fields of study such as global ethics, universalism in various modalities, and ultimately Terence’s famous phrase: *humanus sum nihil humanum a me alienum puto* (“I am a human being; nothing that concerns another human is indifferent to me.”) (*Heaut.*, 77). An influential and famous medieval variant is that of Ibn Tufayl with his *Philosophus autodidactus* (*Hayy ibn Yaqzān*), the man who grows up marooned on a remote island, is raised by an antelope, and eventually reaches the conclusions of philosophy and theology all on his own. A contemporary variant is that of the Japanese philosopher Watsuji Tetsuro, who finds the foundation of culture in the fundamental unity of the human species (2017, p. 21).

Turning to more concrete references, and in relation to the nautical context of my current research, Denis Cosgrove has studied how in geographical representations, from Ortelius to the present day, a cosmopolitan philosophical vision of Stoic roots can be recognised (2003, p. 867); it is in fact the same source that nourished Terence.

To illustrate the kind of cosmopolitan substratum or common ground of human culture that I have in mind, I will now present three examples. They are related to two



broad areas that might be included under the labels of “macrocosmic” and “microcosmic”, i.e. one concerning the natural world, including astronomy and geography, and another concerning the human being, including medicine and what we would now call psychology.

The first example is relatively famous: when the Portuguese fleet led by Vasco Da Gama sailed along the African coast in 1498, they were looking for a local pilot who knew the Northwestern Indian Ocean routes, and who could take them to India. In the port of Malindi, at three degrees south of latitude, in present-day Kenya, they found the pilot they were looking for. This is the description of the encounter:

vinha um mouro, guzarate de nação, chamado Malemo Cana, o qual... aceitou quer ir com eles. Do saber do qual, Vasco da Gama, depois que praticou com ele, ficou muito contente, principalmente quando lhe mostrou uma carta de toda a costa da Índia arrumada ao modo dos mouros... (Barros, 1778, p. 319-320)

... there came a Moor of the Gujarati nation, called Malemo Cana, who agreed to go with them. Vasco Da Gama, after conversing with him, was very satisfied with his knowledge, especially when he showed him a nautical chart of India drawn up [i.e. marked with nautical bearings] in the manner of the Moors (Ames, 2009, p. 67-68).

This famous passage has a lot to cut through, but what is of particular interest to us now is the mutual recognition between experts. A little later in the narrative, Da Gama shows the Gujarati pilot some navigational instruments and, according to the chronicle, “the Moor was not surprised,” and said that they had similar things and showed his own instruments for measuring stellar altitude. In other words, at the initial moment of this encounter between two worlds, there was *an immediate recognition*. A recognition of what? The nautical charts were different; the instruments were different; the languages were different; and yet there was a recognition—of what? Following Bartelsen, we would expect a shared cosmology. This may be right, but I think we can and should be a little more precise.

My second example is much less specific: it is the encounter between the pharmacopoeia of Europe and India that took place through the activities and in the works of García de Orta (1501–1568). This physician and botanist of Portuguese origin published in Goa, in 1563, his *Colóquios dos simples e drogas e cousas medicinais da Índia* (*Conversations on the simples, drugs and medicinal substances of India*), which directly or indirectly became over the centuries a basic reference for European pharmacology (Raj 2016, p. 273-274). It is a book in which an insistent emphasis is placed on the verification of the knowledge received from the Hippocratic tradition. His *Colóquios* are dialogues



dealing with the *materia medica* of Asia in alphabetical order. In one of them, one of his own oriental interlocutors characterises him in this laudatory way,

O doutor Orta as sabe melhor que nós todos, porque nós sabemos as dos Gentios somente, e elle sabe as dos Cristãos e Mouros, e Gentios melhor que nós todos.

Doctor Orta knows them better than all of us, because while we know [the medicines] of the gentiles only, he knows those of Christians, Moors and gentiles better than all of us (1892, II, p. 331).

My colleague Fabiano Bracht, who has studied this encounter in detail, speaks of a “dynamics of dialogue and conflict in the encounter between two worlds” (2019, p. 108). The conflict is, of course, the best known aspect, the greed of trade wars, battles and massacres. But the question that interests me at this point is how was this dialogue established between Hippocratic and Ayurvedic medicine, with the addition of the tradition of Islamic medicine, which Garcia de Orta knew and appreciated? How was it possible, or rather, what made this dialogue between such apparently dissimilar therapeutic systems possible?

It is not necessary for the present article to go into the details of the recognition and dialogue of these two examples, and indeed that is something I can leave to my colleagues who do understand nautical science and comparative medicine. But I venture to suggest that in some of the words used so far, like “cosmology” and “dialogue”, we already have enough clues to outline that first globality which I consider to be the substance of globalisation.

On the one hand, when we say cosmo-logy and when we say dia-logue we are in both cases talking about λόγος (*logos*), the Greek word meaning order, word, speech and proportion, an inseparable combination of the linguistic and the arithmetical, and above all *something that can be explained and understood*. Not all knowledge can be explained and understood; it is a characteristic feature of *dialogical* knowledge, knowledge transmitted by means of *logos*.

When Da Gama and Malemo Cana met, they needed an interpreter and they had so many cultural differences, but oh, how happy Da Gama was to recognise in this Gujarati pilot a qualified interlocutor! They recognised each other in their knowledge of the *logos* of the macrocosm, that is to say their knowledge of the eloquent order of the natural world, which they both knew how to read and calculate: the map grid, astronomical observation, the directions of space. In the same way, Garcia de Orta recognised the

familiar order of human physiology reacting to drugs in the exchange with Indian and Arab doctors, and in the experimentation of an unprecedented materia medica he recognised the *logos* of the microcosm on which medicine is based.⁹

A similar image, and our third notable example, is that of the Dominican Father Ignacio Muñoz (1610–1685), when he was confronted in Manila with the Chinese and Japanese compasses of sixty and twenty-four directions (Moreno Madrid, 2021). As I have mentioned elsewhere (Acevedo, forthcoming 2026), the division of the space bearings, the rhumbs of the compass, can be multiplied in various ways, but they will always be multiples of two and multiples of four, because they are based on the cardinality of the division by the two fundamental axes, north-south and east-west. That is, we can divide the circle of the horizon in just four directions, or twenty-four, as was the Ancient Aristotelian division of the winds, or thirty-two, as was the usage of Mediterranean mariners, but there is no escaping the base-4 determination. Muñoz observed and noted the difference, but regardless of the number of subdivisions, he found the practical applications were similar. And so with this image of the primary division of the circle, which is the circle of the horizon as used by sailors, a very practical device indeed, we can go back to our theoretical reflections.

It seems clear that a fundamental aspect of globality, something indispensable for globalisation at its simplest levels, is the intelligibility of the world and of the human. Hence the primary importance of the exchange of knowledge in the dynamics of globalisation. It is worth recalling that in Greek philosophy man was once defined as *zoon logon echon*, “a living being endowed with *logos*” – what has often been simply rendered, “a rational animal.” More specifically, trying to make sense of the import of the original, it means “a living being capable of analogical and discursive thought, and of dialogue” – a living being capable of putting things in relation to one another, what in strict etymology can be said to be a “dia-logue”.

When we speak of the universality of science, we think of what is called intersubjectivity, i.e. that regardless of the knowing subject, the object of knowledge is the same, and we also think of the reproducibility and repeatability of experiences (Masoumi Hamedani, 2008, p. 58-59). The first of these concepts refers more to something cognitive, and the second to something practical-experimental, or we could say, using the terms

⁹ I have in mind here the principles of pharmacokinetics and pharmacodynamics that some contemporary researchers refer to as “the natural defense logic of the body” (Li *et al.* 2025), and that in earlier times has been the *vis medicatrix naturae*, the “healing power of nature” (King 2020, pp. 409-10).

carefully, that they refer respectively to science and technique. These two aspects of the encounter between experts in a discipline, the scientific and the technological, combine naturally in the three examples presented above. In the literature of the time, we spoke of *ars et scientia*, or *ars et ratio*, to indicate these two inseparable facets of the practice of a discipline. Today, we have to resort to neologisms to try to recover the pre-modern understanding, and so the useful term *technoscience* (Smith, 2009, p. 358) has come into circulation. Both navigation and medicine were evidently technosciences, and their respective experts in the remotest lands were in a sense connoisseurs of different dialects. Invoking the Saussurean linguistic terms *langage* and *langue*, it may be said that by mastering their discipline, these scientist-practitioners were endowed with the “linguistic” faculty (*langage*) that allowed them to communicate despite the formal barriers of their particular “languages” (*langues*). This can manifest, for example, in the recognition of the usage of a foreign *materia medica*, or in the familiar approach to new instruments of astronavigation.

One way of understanding this commensurability relates particularly to the art of navigation because it has to do with our situation on the planet, with our subjection to the same parameters. That is to say, all human beings witness the same basic experiences, cosmographically speaking: we all see the same sun rise and set in the same way, we see the same constellations, and weather phenomena affect us in almost always identical ways. Our cardinal points and the division of time are based on the same understandings of basic elementary phenomena, prior to cosmological theorisations, explanations and associations. Likewise our relationship to the elements and elemental compounds: iron, water, fire, sand, wind, salt... In the list of known simples and materials common to most known cultures, there is a kind of “extended periodic table” of substances that as an animal species on this planet predisposes us to dialogue. Examples abound. That is to say, to point out again something quite obvious, that *a shared cosmology necessarily presupposes a shared cosmos*. The rule of Count Arnaldos in the medieval romance applies to the transmission of knowledge: *Yo no digo mi canción / Sino a quien conmigo va* (“I would only tell my song / To whoever sails with me”) (Menéndez Pidal, 2004, p. 202-203).

Cosmos

In the same vein, it will be illuminating to draw attention to the other Greek root we have in cosmo-logy. I refer to κόσμος (*kosmos*), which means “a beautiful order” and in particular “the beautiful order of the world.” When we say that the primordial globality – substrate, foundation and sign of any well-understood globalisation – depends on a kind of universal cosmology, we are also saying that there is a shared perception by all human beings of the beautiful order of the world. It is not only the structure and intelligibility of the world that predispose us to dialogue and trade, but also the realisation of the beautiful order of reality.

We could then, thinking of the two roots, *kosmos* and *logos*, speak of two aspects, discourse of the world and music of the world: Ptolemy and Pythagoras. Ptolemy as a basic reference for astronomy and geography throughout the Middle Ages and well into the modern period; Pythagoras as an omnipresent influence through countless channels of transmission in Greek, Latin, Arabic and Hebrew, of the harmonic vision of the world, a combination of quiet music and natural arithmetic.

With such parameters in view, and making our epistemological effort to adapt to medieval and pre-modern views, it is not difficult to see another aspect of the same dialogue, one which illustrates how cosmology can have diverse and direct relations with religion and religiosity. It is almost a truism to say that in all civilisations prior to our own, the basic principles of the vision of reality were a central part of religious doctrines, expressed in mythical, theological or philosophical ways (Kragh, 2020). This traditional conjunction of science with religious doctrine is an indication, almost an explanation *in nuce* of the crucial role played by religious orders in the development of globalisation. It sheds light on the role played by religious orders, be they European Christian, Muslim Sufi or Southeast Asian Buddhist orders, in the transmission and circulation of knowledge during the encounters of the first Iberian expansion in America and Asia.

The role of the Jesuits in the scientific dialogue between the Chinese and Portuguese empires is well known, and perhaps one of the most notable examples. Translations of Euclid and Aristotle into Chinese (Wardy, 2000, p. 77-78), for example, and of the *Book of Changes* (*Yi Jing*) into Latin (Smith, 2012, p. 25-27), were the fruits of shared labour between European and Eastern scholars during the sixteenth and seventeenth centuries. Less well known, and perhaps of more immediate and palpable importance, is the fact that European navigators learned from their Asian counterparts how

to navigate the regional maritime routes and came to master them gradually after the first forays. Sailors and friars represent here two extremes, perhaps, of the spectrum between *scientia* and *ars*, theoretical and practical, or intellectual and technical knowledge.

The prominence of the Jesuit order in these exchanges cannot be reduced to a proselytising missionary interest, since for decades they themselves had already been engaged in teaching cosmography and other sciences from their centres in Lisbon and Rome (Ribeiro, 2023, p. 254-352). Rather as a direct echo, a continuation indeed, of the role of the religious orders in the origin of the universities, the “travelling fathers” played a central role in the transoceanic scientific exchange, not as an extension of an administrative function, but as a renewed expression of the link between scientific and contemplative activities. As has been observed in the wake of Pierre Hadot’s *oeuvre*,

“The one who seeks knowledge, according to Aristotelian thought, cannot be a simple collector of facts. The contemplative life consists of a constant activity of search for knowledge that ‘one could dare to define as an almost religious passion for reality, in all its aspects, whether humble or sublime, since in all these things there is a trace of the divine’” (Bergamo 2024, p. 939).

Conclusion

As I bring together the threads of the preceding paragraphs, and going back to the title of the conference that hosted these reflections, it may be expedient to revisit the usage of the phrase “Genesis of globalisation” – now with a capital G, to mean explicitly a cosmogony, world creation, world origin. In doing so, we must remember that, as in the biblical cosmogony, what is commonly conceived as a nothingness, the famous theological *nihil*, is rather a word, like a verbal imperative, a cipher or an alphabet *in divinis*, that same alphanumeric raw material discussed in the Talmud, or a book, but in any case, “before”, prior to the articulation of words, something that only seems a void because it has not been set in motion. Similarly, when we consider the epistemic and cultural enactment of the shape of our globe (including commercial and military ventures), what we call globalisation, it is clear that the elements of *a fundamental shared cosmology* are already latent before the encounter between those who will eventually be agents of globalisation. It can be said, when seen this way, that *globality is globalisation in potency*, waiting for the trigger of the great voyages of exploration to activate and manifest itself, i.e. to make it clear that *globalisation is globality in act*.



Now, thinking topically, with a view to discerning the relevance these pages may have in our troubled world today, it seems also fitting to note that when speaking of genesis, the expression “In the beginning” does not refer to a beginning in time. Neither the Hebrew expression *be-re’shit* (Gen. 1:1, “*In the beginning* God created...”) found in the Old Testament, nor the Greek expression ἐν ἀρχῇ (*en arche*, Jn. 1:1, “*In the beginning* was the *logos*...”) found in the New Testament, refer to a “beginning” in a chronological sense, but to a beginning in a metaphysical sense and thus *outside of time*. The key terms, Hebrew *re’shit* and Greek *arche*, translated as “beginning”, would for the most part be better translated as “principle” – “*In the principle* God created...”, and so on. It is for this reason that Abrahamic theologies agree in observing that creation is not an act that happened once and never again, but instead something that is always happening again, in fact sustaining our day to day life: the creation of the world is a ceaseless re-creation, and it is happening right now, in the “beginning” (Coomaraswamy, 1947, p. 2–3).

This abstract and rarefied fact is of immediate interest to us because it means, to return to my proposed analogy, that the process by which globalisation becomes manifest is not an isolated moment in the sixteenth century or in any century, but a process that is happening permanently.

In every encounter of cultures, in its countless forms and possibilities, and even in every individual interaction, a dialectic between underlying globality and visible globalisation is taking place right now. It is an often difficult dialectic, as childbirth is often difficult, sometimes traumatic and sometimes even terrible — but being aware of it, and above all of the crucial role of knowledge in this dynamic, should help us orient globalisation towards its best possibilities. Each one of us, as the agents of globalisation that we are naturally called to be in these times, carries within, in the essential form of our culture vis-à-vis the common world around us, the possibility to contribute to a truly human globalisation.

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