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The nature and dynamics of world religions: a life-history approach

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In contrast with tribal and archaic religions, world religions are characterized by a unique emphasis on extended prosociality, restricted sociosexuality, delayed gratification and the belief that these specific behaviours are sanctioned by some kind of supernatural justice. Here, we draw on recent advances in life history theory to explain this pattern of seemingly unrelated features. Life history theory examines how organisms adaptively allocate resources in the face of trade-offs between different life-goals (e.g. growth versus reproduction, exploitation versus exploration). In particular, recent studies have shown that individuals, including humans, adjust their life strategy to the environment through phenotypic plasticity: in a harsh environment, organisms tend to adopt a 'fast' strategy, pursuing smaller but more certain benefits, while in more affluent environments, organisms tend to develop a 'slow' strategy, aiming for larger but less certain benefits. Reviewing a range of recent research, we show that world religions are associated with a form of 'slow' strategy. This framework explains both the promotion of 'slow' behaviours such as altruism, self-regulation and monogamy in modern world religions, and the condemnation of 'fast' behaviours such as selfishness, conspicuous sexuality and materialism. This ecological approach also explains the diffusion pattern of world religions: why they emerged late in human history (500–300 BCE), why they are currently in decline in the most affluent societies and why they persist in some places despite this overall decline.

1. Introduction

In contemporary societies, religion is often associated with a particular moral outlook, comprising extended cooperation, restricted sociosexuality and delayed gratification. Many people take for granted that religiosity has been defined by a set of similar values throughout the ages. But this has not always been the case. In hunter–gatherer societies, in agro-pastoralist tribes and in archaic chiefdoms, religious behaviour was mostly about exchanging goods and services with supernatural powers: performing rituals, sacrificing resources and respecting particular taboos in order to get harvests, healing, offspring or protection from enemies [1–3]. It is only at the end of Antiquity that new religions started putting ethical commands before pragmatic and ritual commands [4,5]. The moralizing doctrines of the Axial Age were then adopted by the elite of several large empires and became the foundation of what would become 'world religions'. In the modern world, by contrast, religious concerns have receded in many places, as people in Europe and China, for instance, are largely indifferent to religion [6].

These historical developments raise several questions. Why did world religions appear so late in human history and only in some places? Why did they display, in different civilizations, the same highly specific combination of strong cooperation, restricted sociosexuality and delayed gratification? Why have they become less compelling in many industrialized societies? Here, we draw on life history theory to answer these questions, traditionally addressed either in quasi-theological terms as expressing a human need for specific forms of religion, or else in historically specific terms as the accidental consequence of many contingent historical events. By contrast, reviewing existing data in light of life history theory allows us to provide new answers to these questions and to investigate the birth, rise and fall of world religions as an empirical question.

2. Prosperity and the puzzle of novel values

World religions appeared quite late in history—well after the emergence of agriculture, large-scale societies and early states—and in very specific places (i.e. the Yellow and Yangzi valleys, the Ganga valley and the eastern part of the Mediterranean region). Quantitative studies reveal a sharp increase in energy capture (a reliable proxy for affluence) occurring at the same time in these three regions of Eurasia [7,8]. At the end of the first millennium BCE, these regions reached an economic level (greater than 20 000 kcal capita^{-1} d^{-1}) that greatly surpassed the economic level of previous societies, from 4000 kcal for hunter–gatherer societies to 15 000 kcal for archaic large-scale civilizations like Egypt or Sumer.

In a recent paper, Baumard *et al*. [9] modelled the extent to which different variables were associated with the emergence of world religions. The analyses show that variables associated with affluence (energy capture per capita, urbanization rate, population growth) explain the emergence of world religions better than variables traditionally put forward by social scientists (social complexity, state competition) [10]. This coincidence of economic and religious developments raises again the question of why the affluent classes in affluent societies elaborated or adopted doctrines based on a unique combination of values including extended cooperation, restricted sociosexuality and delayed gratification.

World religions are indeed characterized by the defence of a high level of prosociality [1,3,11]. For instance, they all advocate a version of the 'golden rule' that one should treat others as one would like others to treat oneself [12]. This high level of prosociality is unprecedented in the history of religions as more archaic religions tended to defend a much more restricted prosociality based on parochialism and revenge (e.g. 'an eye for an eye') [1,3,11]. World religions also typically promote 'family values' and condemn sexual promiscuity [13–15]. Historically, this value is recognized as one of the best markers that distinguished the earlier Christians from the pagans [16,17]. The rise of world religions was indeed accompanied by an important change in sociosexuality, with an increasing emphasis on a restricted sexuality [18–20], on romantic love between spouses [20,21] and on high investment in children [20,21]. Finally, Since Max Weber's seminal work on the Protestant ethic [22], non-materialistic and ascetic orientations have been considered a hallmark of world religions. These are indeed characterized by an emphasis on hard work, self-discipline and frugality [23]. By contrast, archaic religions were characterized by their promotion of immediate rewards such as food, mates or power [1,2,24,25].

In what follows, we review evidence demonstrating that this specific combination of seemingly unrelated values is not accidental. Recent advances in life history theory show that these three fundamental features are part of a more general 'behavioural syndrome' [26,27] associated with affluent and predictable ecologies.

3. Life history theory: environments and strategies

The fundamental premise of life history theory is that organisms have limited resources that must be allocated optimally to maximize survival and reproductive success [28]. One hypothesis, often called the 'psychosocial acceleration theory' [29–31], posits that, in harsh environments, where mortality and uncertainty is high, individuals should offset the risks associated with their environment by relying on strategies focused on smaller, but more immediate and more certain benefits. By contrast, when the environment becomes safer, individuals can afford to pursue larger, but less immediate and less certain benefits [28].

To conceptualize this phenomenon, biologists and psychologists often describe these strategies as different points along a slow-to-fast continuum [32–34] (see figure 1). Faster strategies are associated with faster physiological development (e.g. earlier puberty onset, earlier senescence) and a psychological outlook oriented towards short-term results (e.g. earlier reproduction, higher impulsivity). Faster strategies are mediated by well-known markers of decreased somatic investment, such as higher rate of telomeres attrition [35].

Importantly, as shown in figure 1, psychosocial acceleration theory suggests that these strategies are coordinated [26,27]: individuals who develop in a harsh environment develop faster and reach puberty earlier, but they also have more sexual partners, more casual relationships and more children. By contrast, individuals who develop in a safe environment develop slower and reach puberty later, but they also have fewer sexual partners, fewer casual relationships and fewer children. Psychosocial acceleration theory can explain this strong correlation between apparently unrelated behaviours such as a positive attitude towards cooperation and a negative attitude towards sexual promiscuity and material desires.

The evidence reviewed in this paper demonstrates that this framework also accounts for the specific set of values promoted by world religions. Indeed, these values appear to be part of a coordinated 'slow' strategy in response to a particularly affluent, predictable and safe environment. That strategy became common in late Antiquity, when part of the Eurasian population started to live in an environment that was safe enough, predictable enough and affluent enough to trigger such 'slow' strategies. As a result, the Eurasian elites abandoned archaic religions, in which gods are thought to provide resources, protection or social success, to adopt world religions where the gods favour extended cooperation, restricted sociosexuality and delayed gratification, and condemn 'fast' strategies in the forms of greed, violence and sex [1,5,9].

4. Investing in cooperation: extended prosociality

Extended prosociality as a general strategy is best suited to predictable and safe environments. Indeed, being prosocial is an investment that entails refraining from taking the lower but immediate benefits of selfishness to obtain the higher but less certain benefits of reciprocity [36–38]. In other words, prosociality is a risky investment in a social network that is only beneficial when the environment is safe and predictable. By contrast, when the environment is harsh, the benefits of cooperation are more uncertain: individuals may discount the time too quickly for future reciprocity to be advantageous, and potential partners might die, be incapacitated or otherwise disappear. Finally, the cost of error (i.e. trusting a cheater) might be too high for individuals who are already struggling for survival. In these conditions, it might be beneficial to refrain from investing in the uncertain benefits of extended cooperation.

In line with this idea, prosocial behaviours have been found to vary according to the harshness of the environment.

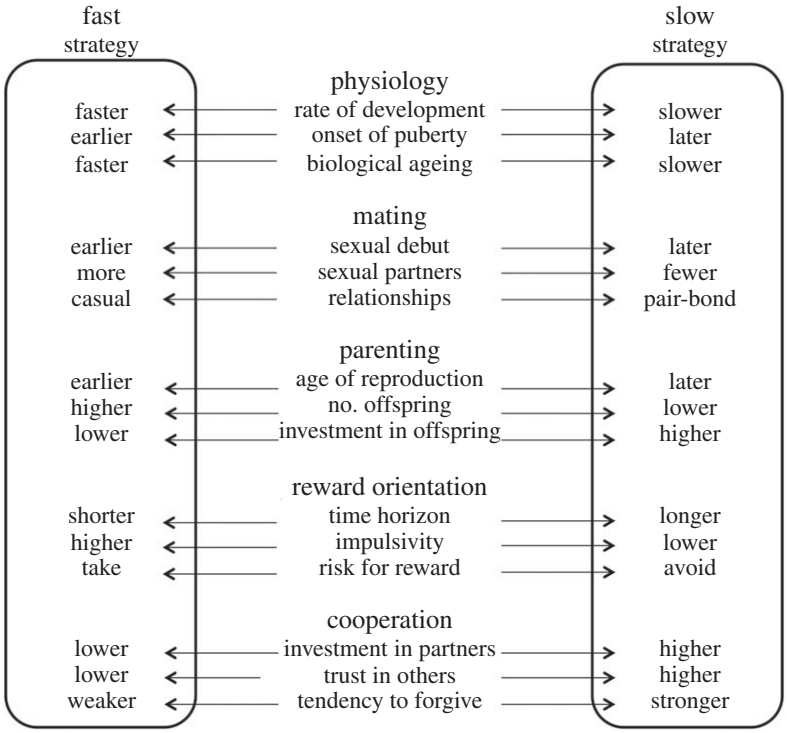

Figure 1. Illustration of behaviours associated with fast and slow life-history strategies (adapted from [33]).

For instance, Nettle *et al*. [39] compared cooperative behaviours in two neighbourhoods in the same British city (Newcastle-upon-Tyne) that differed in socio-economic status (SES). Using a dictator game, Nettle *et al*. found that participants living in the harsher neighbourhood gave significantly less than participants living in the more affluent neighbourhood. This difference was robust across conditions (dictator game with a friend, with a stranger and with a local charity) and across methodologies (economic games, rate of survey return, lost letter experiment). Strikingly, the difference between these two neighbourhoods in Newcastle was bigger than many previously reported cross-cultural differences, including comparisons between participants living in the USA and participants living in hunter–gatherer societies, such as the Hadza in Tanzania [40]. This basic result has been replicated a number of times [41–43]. Participants growing up or currently living in harsh environments tend to defect more [40,41], to forgive less [44–46], to display more anti-social behaviours [47] and to punish cheaters less [47]. They also describe themselves as less prosocial [43] and they score lower on agreeableness questionnaires [48]. Finally, experiments conducted with children suggest that some of these differences can already be observed at a relatively young age [49,50].

Using the life-history lens can thus shed light on the promotion of extended generosity in world religions. More specifically, extended prosociality can be decomposed in several aspects (figure 1), all of which involve a certain investment in others or in the future: (i) 'one should love thy neighbour as oneself' is a rule that enjoins the individual to refrain from exploiting others and to invest in cooperation; (ii) being a 'good Samaritan' entails that one's duty to help extends beyond kinship and ethnic boundaries; (iii) 'turning the other cheek' is linked to the condemnation of retaliation and the promotion of forgiveness, two strategies that are more adapted to predictable environments.

5. Investing in the family: restricted sociosexuality

A standard result in psychosocial acceleration theory is that harsh ecologies impact people's reproductive strategy [51–53]. The human species is characterized by a specific mating system, with a high propensity towards monogamous pair-bonding, a high level of cooperation between males and females, and a high level of male investment in offspring [54], with some leeway for cultural variations [54]. Psychosocial acceleration theory posits that when the environment is harsh, individuals have an interest in diversifying their sexual and emotional investments, having multiple partners, sex without commitment and shorter committed relationships [32,51,55].

Given the costs and benefits associated with long-term relationships, it should indeed be expected that people develop different attachment styles toward their partners in harsh versus affluent environments. Using very large cross-cultural samples (the International Sexuality Description Project—a survey study of 17 804 people from 56 nations), Schmitt *et al*. demonstrated that a negative attitude towards attachment and a lower emotional investment are associated, across cultures, with higher levels of ecological stress: relatively few resources, low life expectancy, high child malnutrition, high fertility rate and high teen birth rates [56,57]. More generally, empirical studies suggest that people growing up in harsh environments do not have the same pair-bonding motivation and mating style as people growing up in safer environments [58–61].

Similarly, there is a trade-off between the average amount of resources that can be invested in each offspring, and the total number of offspring. Therefore, high investment in a small number of offspring is a riskier strategy in environments where child mortality is high ('don't have all your genes in one basket'). In line with psychosocial acceleration theory, cross-cultural studies show that maternal care is inversely associated with famine, warfare and high levels of

pathogens [62,63]. Using data from the British Millennium Cohort Study ($n = 8660$ families), Nettle showed that in harsher neighbourhoods, breastfeeding duration is shorter, co-residence of a father figure is less common and contact with maternal grandmothers is less frequent [64], revealing that various sources of parental investment are lower [65–67].

Importantly for our point here, there is a strong association between limited prosociality on the one hand and sexual promiscuity or low investment in children on the other [68–71]. Thus, low levels of investment in cooperation and low levels of investment in family seem to be part of the same coordinated life-history strategy.

6. Investing in embodied capital: delayed gratification

Embodied capital is the sum of skills and expertise that individuals can acquire through their lifetime [72]. While the human species is characterized by a high level of investment in embodied capital overall, a given individual's investment should be calibrated to her environment. Indeed, high investment in skills and expertise only makes sense if the individual can trust that this investment will pay off in the future. In a harsh and unpredictable environment, it may be more beneficial not to invest too much, but rather to consume as many resources as possible before losing the benefits of one's work [73].

In line with this idea, people living in a harsh environment discount the future more steeply [33,53,74–78]. For instance, experiences of close bereavement are associated with steeper financial future discounting and earlier reproduction [53]. Similarly, earthquake survivors discount future rewards more steeply than control respondents [79]. In longitudinal studies, negative life events in early childhood also predict decreased self-control over time [80], and studies of adopted orphans show that early life adversity is associated with significant reductions in delay of gratification and inhibitory control, even several years after adoption [81,82]. Finally, laboratory studies confirm that children placed in an unpredictable environment have lower levels of delayed gratification [83]. This orientation towards the future translates in a variety of behaviours related to work ethics such as persistence, planning, conscientiousness, foresight, anticipation, and control over one's health and financial situation, which are all regulated by life-history parameters [55,84,85].

Data on materialistic attitudes converge with this literature and suggest that people living in harsh conditions display a strong desire for material rewards and social status [48]. For instance, materialistic values and behaviours are higher when people experienced economic insecurity as children [86,87] or when they are made to think about living in a recession [33,88]. In the social domain, people who experienced harsh parenting styles [86,87,89], whose parents divorced during their childhood [90] or who were socially excluded at school [88,91] focus more on material goods and money. Experimental manipulations of insecurity, via primes of mortality [88,92], hunger [93] and uncertainty [94], consistently replicate these results in the laboratory. Finally, large-scale studies suggest that cohorts born in the 1920s and 1930s, who experienced recession, war and rationing, tend to be more materialistic than birth cohorts born in the 1950s and 1960s [95]. Similarly, cohorts born in the 1980s and 1990s, who experienced high rates of unemployment for their parents and high rates of divorce, rate money and consumption as more important in their lives [96].

Just as limited cooperation and unrestricted sociosexuality seem to be associated, materialistic orientation and limited cooperation appear to be part of the same coordinated life strategy. Indeed, laboratory studies show a correlation between high levels of time discounting and low levels of cooperation in economic games [97–101]. Survey data confirm this association between higher time discounting and more restricted prosociality [78].

7. Strategic moralizing and the belief in cosmic justice

Axial Age doctrines and their world-religion descendants are *moralizing* doctrines: they do not simply recommend a certain way of life; they also describe alternative values as immoral. Restricted prosociality becomes 'greed', unrestricted sociosexuality 'lust' and materialism 'sloth' or 'gluttony' [16–20]. Believers in moral religions also express a strong motivation to repress non-recommended behaviours, to correct individuals and coerce them towards the 'right' way of life. Why is that the case? In principle, people could espouse the values of extended prosociality, restricted sexuality and delayed gratification without any concern for other people's actions.

This may be explained as a consequence of a general principle in human moral cognition, following which people intuitively disapprove of others' behaviours when the latter inflict a cost upon their interests that is not compensated by corresponding benefits [37]. Now, individuals with a slow strategy have a lot at stake in trying to deter others from adopting a fast strategy. The presence and frequency of fast-strategy individuals indeed constitute clear dangers for slow-strategy individuals: others may benefit from their generosity without reciprocating; their high investment in monogamy and children may be jeopardized by sexually promiscuous behaviours; their high investment in embodied capital might be more difficult in an environment where many people favour conspicuous consumption. Thus, behaviours that are typical of fast strategies, such as promiscuous sex, short-term commitment and drug consumption, are typically frowned upon by individuals who pursue a slow strategy [14,102,103].

In short, moralizing attitudes naturally lead people to hold beliefs that legitimize their moral condemnations [104,105]. For instance, belief in free will increases with the desire to hold others morally responsible for their wrongful behaviour and to justify punishment [106]. Similarly, the tendency to condemn others and to see them as morally unreliable is associated with the belief in a moralizing God [107,108]. In line with this strategic motive, moralizing beliefs are more strongly held by people pursuing a slow strategy. For instance, the belief in a just world is associated with a low rate of time discounting [109–111] and a higher level of prosociality [112]. Similarly, there is a correlation between the belief in a moralizing god and higher longevity, greater marital stability, lower delinquency rate, higher level of prosociality or morality, etc. [23,102,108,113,114]. Importantly, longitudinal studies suggest that people's strategy appears to cause religiousness, rather than religiousness causing people's strategy [115–117]. In this perspective, religious beliefs are not part of a life-history coordinated strategy *per se*. Rather, they are a

set of beliefs that are pragmatically held by slow-life individuals to help them moralize fast-life behaviours.

8. Discussion

To conclude, we contend here that the birth, success and potential decline of world religions depend on highly specific ecological conditions. As described here, world religions appeared with the emergence of urban elites who adopted slow life-history strategies. At first, these doctrines were taken up by people who found them natural and compelling, but they then spread to the rest of the world, following the imperial expansion of Eurasian populations [118]. When people in harsher environments were forced to adopt these doctrines, they generally turned them back into 'make a deal with the gods' kinds of religion, where cults of relics and rites of passage had priority over moral transformation and self-regulation. Then, as the industrial revolution allowed more and more people to escape the vicissitudes of a Malthusian economy, slow strategies were progressively adopted everywhere and world religions became truly popular. Finally, in the most affluent societies, religion declined as most people had adopted similar slow life-history strategies. Moral disapproval now had less of a strategic value, and the beliefs that supported it appeared less compelling. Changes in environmental conditions, and evolved human responses to these changes, provide the key to understanding these massive historical and cultural transformations.

If this life-history approach is to be studied further, three points need to be discussed. First, it remains unknown whether the set of long-term-oriented behaviours associated with religions are adaptive or not. Indeed, the high level of resources and low mortality rate of our modern environment are incommensurable to those experienced in pre-Neolithic or even pre-industrial environments [7,119]. It is therefore possible that the human psychosocial acceleration system is calibrated for an environment that no longer exists and that the kind of very slow strategies associated with world religions are in fact suboptimal. For instance, the reproduction rate observed in modern societies is much lower than that which would maximize fitness, in part because people overemphasize the benefits of material goods for their children when it is in fact unclear that these have any direct effect on fitness [120]. However, other scholars have argued that low reproduction is an adapted response to affluent environments where it is important to increase parental investment [119]. Further work should thus study whether or not slow strategies are adaptive in the modern environment.

Second, it is important to discuss how the framework we put forward in this paper aligns with the well-known fact that religiosity is currently negatively correlated with countries' wealth [6]. Here, we suggested that religious beliefs emerge when slow individuals are in conflict with fast individuals and when they need strategic beliefs to legitimize their moral condemnation of fast behaviours (see §6). This strategic view of religious beliefs offers a new account of the decline of world religions, and its quasi-disappearance in the most affluent parts of the world (northern Europe, northern parts of the USA and Canada). As more and more people adopt slow strategies due to the favourable ecology in which they live, the frequency of individuals with a fast strategy is mechanically reduced. In that new environment, it becomes superfluous to invoke supernatural punishment in order to convince others to shift from a fast to a slow strategy. Although the USA is often cited as an exception to the modern decline of religion, it is worth pointing out that in the USA too, religiosity is slowly declining [6]. Moreover, between-state comparisons confirm that higher levels of religiosity correlate with greater frequency of fast behaviours, such as teen pregnancy, teen abortion, alcohol consumption, school drop-out rates or homicide [106,121,122], as well as with higher levels of poverty and inequality [121–123]—two well-known triggers of a fast strategy [35,124]. By contrast, in richer and more equal states, where the environment is less harsh and the frequency of fast behaviours is lower, religiosity is in decline in the same way as in other affluent nations [108,125]. This global pattern, however, does not account for the fact that, in wealthy nations, a minority of affluent individuals display high levels of religiosity (often together with higher fertility [126]). Understanding the psychology and motives of these minorities goes beyond the scope of the current paper but it will be important for future research to understand the origins of these minority behaviours.

The third point that needs to be discussed is how the current framework can be empirically tested. The most straightforward way would be to test the association between absolute affluence, life-history traits and the belief in world religions using ethnographic atlases and historical databases. However, this strategy is rendered difficult by the fact that world religions have often been imposed by force to indigenous populations. To take one famous example, when Constantine the Great converted to Christianity in 312, only a tiny minority (5–10%) of Roman citizens were Christians [127,128]. A few decades later, the great majority of Romans had (more or less willingly) followed the lead of their emperor and officially converted. However, the Christian doctrine embraced by the elite conflicted with the religious traditions of the newly converted Romans. As a result, they soon made their own version of Christianity, adding to the official dogmas new rituals such as the cult of the relics or the blessing of the crops [129]. As a modern scholar, classifying Roman Christians as believers of a 'slow religion' or not cannot simply be based on a quick look at an ethnographic atlas or a historical database. In fact, it is likely that all contemporary world religions are a mix of 'slow' beliefs imposed by the elite, the state or an official church, and 'fast' beliefs freely held by the remaining part of the population [4,5].

One way to get around this difficulty is to focus on cultural areas where the data are rich enough that we can go beyond global labels such as 'Christianity' or 'Buddhism', or official practices such as masses or pilgrimages. For instance, during the Middle Ages, most Europeans were officially Christian but medieval Christianity encompassed a range of fast and slow traditions. Some people, especially during the early Middle Ages, focused on rituals (baptism, relics, etc.) while others, especially in the booming cities of western Europe, adopted behaviours such as voluntary poverty, moderation of sex or help to the poor [130,131]. These shifting preferences could be studied through the rich databases of hagiographies (lives of the saints), which provide an idea of the kind of personal characteristics that were regarded as worthy of religious status across time [132,133]: did people reach sainthood because they defended Christianity against the Saracens (e.g. Saint William of Gellone, eighth century) or because they practised strict asceticism and lived in poverty (e.g. Saint Francis of

Assisi, twelfth century)? Specifically, psychosocial acceleration theory predicts that the rate of slow features in hagiographic databases will increase as living conditions improve. Preliminary qualitative works suggest that this link indeed exists both within the church (e.g. the Franciscans, the Dominicans, the Beguines, etc.) and outside the church (e.g. the Humiliati, the Waldesians or the Cathars) [130,131].

Contemporary Christianity offers another possible test case for the theory as it encompasses thousands of different movements under the same belief in Christ. The so-called 'prosperity theology', for instance, appears to be a very 'fast' Christian movement [134]. According to this branch of Christianity, financial blessing is the will of God, and faith and donations to Christian ministries increase one's material wealth and security. In line with the life-history approach, prosperity theology has been compared to tribal religions in which believers are part of a complex gift-exchange system with believers giving to God and then awaiting a gift in return [135]. Again, qualitative studies suggest that prosperity theology has become popular among less privileged populations, especially among African Americans, Latinos and immigrants [134]. Further large-scale studies, using tools like the World Values Survey (www.worldvaluessurvey.org) and its questions about religious practices, could further test this association between resource-oriented religious movements and lower living standards.

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