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Multi-scalar cognitive time: Experiential time, known time, and Maya calendars

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ABSTRACT

From a cognitive perspective there are two different "regions" of time. These are *experiential time* and *known time*. Each one has multiple temporal scales and both are mutually irreducible. These different scales of time are needed to coordinate phenomena in regions of various magnitudes (molecules, cells, organisms, social groups, etc.). Experiential time is perceived to be continuous by our senses but there is a limit to this temporal reproduction. Durations longer than a minute need external devices to be known.

The Maya calendars manifest known time and they were and still are designed to order the days, i.e. the passing of time. The calendars have been created from cognitive interaction with digits, aging, pregnancy, vegetative cycles, the sun and phases of the moon, the hydrological cycle, i.e. from objects and the events they generated. Once established these calendars have also affected the way time has been perceived individually and collectively.

With the collapse of the institution of divine kingship during the 9–11th centuries AD, the accumulative time of the Long Count disappeared in favor of the cyclical Short Count. This change implies not just sociopolitical changes but also cognitive changes. Knowledge of earlier history and engagement with ruins and artefacts enforced an understanding of previous creations and their associations with repeated periods of time.

1. Introduction

Time is elusive. Yet, we need a definition of time in most contexts and there are many to choose from. The standpoint I shall take in this text on multi-scalar cognitive time is that time is an abstraction reached through the changes of objects (those changes are events). We do not perceive "time as such" but we perceive events, their durational qualities and lapses between events, their order, and relations to other events.

I shall make use of two different "regions" of time (but not two different kinds of time). These are *experiential time* and *known time*, and each has multiple temporal scales and both are mutually irreducible (Wackermann, 2014). These different forms of time are needed to coordinate phenomena in regions of various magnitudes (molecules, cells, organisms, social groups, etc.). Different "clocks" rely on rules that define each region. Here, a clock is a device that creates observable periods with an internal rule. The time scale of each clock for each region must be uniform (Wackermann, 2013). All minutes must consist of 60 uniform seconds, not more, not less.

Some objects are used to quantify the long-term (here defined as durations longer than the reproduction of subjective/experiential time (roughly 100 s)). Clocks and calendars affect the way time is subjectively experienced and collectively known. Importantly, they do create events that would not occur without them. For example, without holidays in a calendar, certain celebrations or family reunions would not occur. Weekends encourages other behavior than during the rest of the week. Public transport departs at specific hours and minutes. Calendars and clocks are taken for granted since we often encounter them or the events they produce. According to anthropologist Kevin Birth (2012), human-made clocks (and calendars by extension) are "necromantic devices." They are objects created by people who have been dead a long time, but whose past contributions affect concepts and perceptions of time for a long time afterward. The Babylonian numerical system has given us 60 s/min and 60 min/h. Calendars in particular have organized and shaped people's lives for millennia. We still use the names of Roman months.

The Maya calendars were and still are devices designed to order the days (Stuart, 2011). They have a long history but the usage of some of the calendars changed after the political collapse of divine kingship (*ajawlel*) between the 9th and 11th centuries AD. The

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accumulative Long Count calendar was eventually replaced by the *cyclical* Short Count calendar (Edmonson, 1979; Puleston, 1979). There are many plausible explanations for why this happened. One important factor is that the Long Count was strongly affiliated with the divine kingship, contrary to the calendars that survived the collapse. This paper suggests that the change in structure between the Long and Short Counts also implies cognitive changes with regard to known time but not experiential time. However, without experiential time we would be unable to perceive time in the first place. Cognitive time must therefore be approached from a multi-scalar perspective, from the level of neurons to political systems and celestial objects.

2. Representation and the extended mind

Clocks and calendars can be seen as "external representations" of time. However, as representations they work differently than the way human subjects perceive time. One of the reasons is that our consciousness most likely is not made up of "internal representations." According to the computational theory of mind, representation is the main mechanism by which humans gather information from the world, and through representation we externalize our mental contents into the world (Malafouris, 2007). This "I-centric" view of representation depends on the idea that the mind is a property that belongs to a human individual and its spatiotemporal constraints. The individual has an ontological priority in cognitive processes (Malafouris, 2013). This is a perspective which has affected previous ("processual" and "postprocessual") archaeological perspectives where "material culture and language were treated as intentional expressions of concepts that had prior formation in people's heads" (Barrett, 2013, p. 1).

Instead, following the works of Clark and Chalmers (1998) and Varela et al. (1991), Malafouris redefines internal representations as neural activation patterns in the brain that contributes to and should, to him, be seen as parts of a dynamic continuum between brains, bodies, and external objects. Neurons do not represent anything. They form plastic networks that produce activation patterns that are coupled to the rest of the body and other objects (Malafouris, 2013).

As for the role of external representation, Malafouris (2007) proposes that, for example, Palaeolithic cave imagery became a scaffold that made human perception aware of itself. The Palaeolithic image was a prosthetic part of visual perception, an extension of the brain and part of a new cognitive strategy lacking in earlier hominids. Likewise, I shall argue that calendars became part of new cognitive strategies as well.

According to Malafouris and Renfrew (2010), an *engram* is the internal ensemble of neurons and an *exogram* is the external ensemble of objects, scaffoldings, and representations. The interface between an engram and an exogram enables, constrains, and specifies interaction between objects. From this perspective, the calendar is an exogram. It still consists of "material signs." The glyphs for calendar days and other temporal units include symbolic meaning, phonetic values, etc., but originally, and primarily, a material sign is expressive and substantiates concepts. There is no inherent representative meaning in the material signs, only a capacity for meaning. People engage meaningless signs in a meaningful way. Thus, material signs bring forth ideas rather than represent reality (Malafouris, 2013).

Human-made objects ("material culture") are "*co-extensive and consubstantial with mind*" (Malafouris, 2013, p. 77, original emphasis). Our own beliefs and memories are connected to objects and events external to our body. However, many of these objects and events are not human-made, particularly the ones related to how long-term time becomes known (the sun, the moon, the night sky, seasons, tides). One of Malafouris' most important arguments is that, "the mind does not inhabit the body; rather, the body inhabits the mind. The task is not to understand how the body contains the mind, but to understand how the body shapes the mind" (Malafouris, 2013, p. 60).

This means that cognition cannot be found in a specific location since the mind exceeds the single object a person deals with. Aspects of cognition would rather be found in a widely distributed object as suggested by Gell (1998) and Normark (2006). To Gell, an artist's whole *œuvre* can be seen as a distributed object where each artwork is the index of and/or prototype for the artist's "agency" or, rather, some cognitive aspect of the artist. The artwork is also the index or prototype for another artwork in the same œuvre. Hence, a carved Maya stela is the index of or prototype for other carved stelae in the local or regional corpus.

Malafouris (2013) argues that cognition is relational and occurs "between" rather than "within." However, what appears to be "between" two or more objects is always "within" a larger object (Harman, 2011), sometimes within the distributed object Gell discusses. The corpus of Classic period Maya stelae is part of a larger object/organization, namely the divine kingship (Normark, 2012). Objects consist of parts that are objects in themselves and objects are therefore also part of other objects (Harman, 2011). When two or more objects interact and form a new object new properties also emerge (DeLanda, 2006). Emergent properties are also events, i.e. when sunlight interacts with a surface and a human being sees a different color on that surface than when there was shade, this "coloring" is an emergent property and an event at the same time (Bryant, 2014). These events are what we perceive, and they lay the foundation for time perception.

Contrary to Malafouris, I suggest that there is an actual boundary of the extended mind, but it is a fluctuating boundary, quite like the boundary between shore and sea during high and low tide. The boundary of the extended mind is more limited, yet more open, in an infant. The boundary is more extensive, yet more rigid, in an adult. As an individual or organization exists and gathers connections with other entities, its trajectory usually become less open. It becomes more determined. This may be one reason why endings and beginnings of calendar periods are important in most communities. A new period opens up new potentials. In making New Year's resolutions, people individually try to break with their past bad habits and constraining social conventions. The attempt is to open up our mind to the future. It seldom succeeds because that future is intertwined with the predetermined calendar and entities on a scale beyond our influence.

Just as Malafouris, I am interested in *how* people were thinking rather than *what* they were thinking. Humans think through, with, and about objects (Malafouris, 2013). Objects create events, the foundations for time. An object may also function as a medium for another object. Different media, like Maya codices (folded bark books), painted ceramics, and stelae, activated cognition in different manners and this also affected the way ideas were transmitted. For example, stelae with large carved and painted glyphs could be seen at greater distances and by more people compared to small glyphs in a codex (i.e. Sanchez, 1997). Thus, media are not only externalized information but the very process of information. Indeed, "the medium is the message", as it modifies activities and the way objects relate to one another. Different media introduces new skills and affordances of the cognitive system. Someone using the codices and understanding their contents (calendars and almanacs) was engaged in a cognitive behavior different from that of illiterate people observing a stela. Glyphs may have been read out loud to an illiterate audience (Houston and Stuart, 1992).

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