For a Proportion Principle-based Gameplay Design

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Game Design has nourished on the advent of several methods for gameplay development. The most well-known are the MDA framework (Hunicke et al. 2004), Fullerton's Playcentric Approach (2008) and Bjork's and Holopainen's Design Patterns (2004). Each of the models specifies an objective, the elements to work with and the agency and experience to be afforded to the player as final outcome. Given that videogames are human constructions, it can also be possible to take very different perspectives than the ones already explored and turn to a design pattern of long-established tradition and presence: the mathematical Golden Mean and its concept of proportion.

The Golden Mean, term associated with the number Phi, has been identified in a myriad of elements in the universe. It is noticeable in DNA-framework models, in physiological structures of living beings, in crystal formations, in the proportionality of the human body and even in the geomorphological formation of the Earth and in the arrangement and circulations regularities of some planetary objects of our Solar System (Stakhov 2001). In the Arts this concept has been integrated as the main design element for many works such as the Egyptian Pyramids, the Greek Parthenon, the Dome in Milan the Yakushiji Pagoda, Raphael's painting "Crucifixion" Da Vinci's, "Last Supper" and traditional Chinese, Egyptian and Greek pottery (Ghyka 1977), among many other examples.

Even though many philosophical and artistic explanations exalt, mystify or in cases even undermine the function of this ubiquitous pattern in our surroundings (López 2008), a group of scientists related to the mathematical study of the properties of Phi provide more practical explanations. These researchers claim that this structural model has economical reasons in plants; its purpose being in the efficient absorption and distribution of energy; while in other elements of Nature constituting a suitable ratio of configuration in such a way that there is present proportionality and a coherent relationship between parts of a whole (Stakhov 2001).

While traditionally and widely applied in other domains, the potential of the Golden Ratio has not been examined yet in the realm of videogame design. And even though Phi has influenced computer-generated art (Museum of the Golden Ratio), its implementations in playful systems remain an unexplored ground. Because of conditions only afforded by games such as emergence, progression, immersion, procedurality, challenge, negotiations and engagement, the inclusion of the Golden Mean to a game design practice and its implications offer a novel and promising approach.

Videogames feature several components that can be measured or quantified and for which the Golden Mean as design element could yield positive contributions propitiating proportionality within the systems. The study of the implementation of this mathematical concept for gameplay creation implies identifying and reworking the structural and measurable

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constituents compatible with a principle of proportions. Players should be able to interact with the specific game aspects configured around this numerical notion or experience the different states produced.

For example, a potential application of the Golden Mean for Gameplay Design can be the creation of games whose parts grow or evolve by implementing the proportional growth forms of Dynamic Symmetry and the Whirling Spiral (Hambidge 1920). These two numerical frameworks can be applied to models that allow picturing levels as measurable geographical units and with accountable items as challenges. These models can the Mission/Space framework (Dormans 2012), the Rhythm-based level generation model (Smith et al.2009) or the 2D Platformer Analysis framework (Smith et al. 2008). This design practice would be tracing a method featuring game progression and would be more suitable for Mario Bros-style platformers and mission/stage-based casual games.

This design work displaying the effect of progression leads to two potential perspectives. One that is a model in which, based on the performance of the player, levels can progressively adapt and grow geographically and challenge-wise offering an adaptive experience; and another path, that consists of having a pre-defined game space that develops proportionally to subsequent stages with this number-based pattern as main reference.

The contribution of this specific design practice resides in offering a method for structuring game elements based on proportions allowing players to experience dynamical adaptations in different states. This model can not only work as a referential point for game designers to generate units and its subsequent parts, but also can influence new methods of procedural content generation and adaptive play.

The implementation of the Golden Mean and the number Phi as an ingredient for Gameplay Design also opens the door for new discussions within Game Studies around other potential advantages this ubiquitous pattern can have for games as well as its implications and effects on players. After all, if Nature has evolved persistently incorporating this code into so many expressions, it could be also useful to continue considering this element as a creative variable for many other human digital and interactive creations including videogames.

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