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The Interactor Cedes Control
An Heuristic for Planned Serendipity in Interactive Systems

Ricardo Melo[1]
ricardo@ricardomelo.net

Miguel Carvalhais[2]
mcarvalhais@fba.up.pt

[1] ID+ / FBAUP
[2] INESC TEC / i2ADS / Faculty of Fine Arts, University of Porto

Abstract
As part of our development for a framework for serendipity in interactive systems, we identified specific heuristics that, when implemented in the design of interactive systems, encourage serendipitous experiences, meaning experiences that are unpredictable and valuable. One of these heuristics—Interactor Cedes Control—and the subject of this paper, serendipity is not the result of a natural occurrence or a designed system to which the interactor is unaware, but occasions where the interactor purposefully relinquishes control from the interaction as a creative methodology or in order to increase the delight and surprise in both mundane activities, and in the creative and performative practices. To that end we begin with an overview of the serendipitous potential and history of the digital medium, followed by an argument for artificially created serendipity that enables the design of serendipitous systems. Lastly, we identify the distinct methods (namely Generative Systems, Automatisation, Randomisation, and Multiple Agents) which constitute the Interactor Cedes Control heuristic of the larger framework.

Keywords
Serendipity
Unpredictability
*Un*control
Interaction
Digital Medium

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1.A Serendipitous Medium

The digital medium is one that not only affords serendipity, but was born from the concepts that serendipity represents, and it can be found in both the medium's heart and genesis.

We can trace back the influence of serendipity in the foundations of cybernetics by Norbert Wiener. Citing Fred Turner, Sebastian Olma argues that the MIT's Rad Lab was an example of an institutionalised serendipity environment (Olma 2016, 136) which created the necessary conditions—namely openness and interdisciplinarity—that encouraged a transversal exchange of knowledge that, in turn, enabled Wiener to create the discipline of cybernetics, which itself allowed for the development of ARPANET, one of the technical foundations of the internet. As put by Olma: "ARPANET as the first iteration of today's internet can this be seen as the cybernetic materialisation of institutionalised serendipity, merging the academic gift economy with the cybernetic dream of self-organisation and self-governance through constant feedback loops." (2016, 145).

If serendipity is in the digital medium's genesis, it is also within its goals, for J.C.R. Licklider aimed for the intergalactic computer network to connect idiosyncratic scientific knowledge, a feeling that is echoed in Tim Berners-Lee's vision for the World Wide Web: "an open platform that would allow everyone, everywhere to share information, access opportunities and collaborate across geographic and cultural boundaries." (2017)

The digital medium was born due to serendipity and was created aiming towards serendipity. It is, as well, one that affords serendipity, due to how it allows for the free connection of people and information.

I happen to believe that the Web, as a medium, has pushed the culture toward more serendipitious encounters. The simple fact that information "browsing" and "surfing" are now mainstream pursuits makes a strong case for a rise in serendipity, compared to cultures dominated by books or mass media. (Johnson 2010)

The sheer quantity of information that the digital medium allows one to have access to, in theory, multiples the possibilities of connections and encounters that are possible in the medium. In practice, the tools we have developed in order to manage and access that information have set restrains and limitations to the fortuitous encounters one might have.

While serendipity may, and does, occur naturally in the digital medium, it may likewise be provoked through the design of systems that create the appearance of chance in an interaction. If this chance occurrence is one that adds a particular value to the experience (REDACTED 2016), we may be experience a form of *artificial serendipity*: serendipity that resulted from a planned or designed experience.

2.The Interactor Cedes Control

In the case of artificial serendipity, it is the *experience* of unpredictability and apparent *accidentality* that allows for the feeling of *unsoughtness*. While this opens the opportunity for a designer to explore this concept into interactive systems—without user awareness—it is also possible that it is the interactor herself that chooses to purposefully introduce unpredictability into her interactions with a system as a way to inject serendipity into the process.

This is achieved by purposefully relinquishing control of an action or process as a way to let herself be surprised by a possible result, be it through generative systems, random or pseudo-random processes, or through multiple agents (human or otherwise). In the following sections we will explore our identified methods for achieving planned serendipity in these interactive systems.

3.Generative Systems

By *Generative Systems* we consider what Galanter referred to as rule systems with generative potential (2006), which describes systems capable of a certain degree of autonomy or "capacity to produce novelty and to take the creative control from the artist" (redacted 2010).

Here, the user cedes control of an action or series of actions to external processes (created by herself or others), as a method of introducing a level of surprise into the outcome, through instructing the system with a specific sequence of actions and operations that are done procedurally and without the user's interaction, besides the initial setup.

Galanter lists twelve different rule systems which are generative systems: rules as algorithms, rules as recipes for autonomous processes, rules as a well-defined widely applicable process, combinatorial rules, numerical sequences as rules, line composition or drawing rules, the rule of serial generation, tiling and other symmetric composition rules, chance operation rules, clustering rules that create composition, mapping from one domain to another, and rules which create cycles and phase interactions (Galanter 2006). While we won't go in detail in these rules, it is relevant to consider that all these systems, through the added generative process to the rules, introducing the possibility for autonomy in the process and, therefore, deviation in the final result (as opposed to non-generative rule systems, which would replicate the outcome without variation), is able to introduce unpredictability into the process, leading to moments of serendipitous epiphany.

4.Automatisation

While the following *Automatisation* can be considered an example for a *Generative Systems* (namely rules as recipes for autonomous processes), we single them out because of their other possible applications, as mechanics and not systems.

Automatisation, while with various possible applications, is often used in creative practices, both as a way of expediting and simplifying common and repetitive tasks, but also as a way on introducing surprise into the process, be it through variations introduced through the automatisation practice or through external interference.

While *Automatisation* is commonly used in software that allows for a type of task automation—as in the batch process functionality of, for example, *Adobe Photoshop*—this is often developed for fine control of specifically intentional actions, where the intention is more on saving time and reducing repetitive tasks, rather than the production of novel artefacts or encouraging surprise and unpredictability. Due to the complexity of certain implementations of the *automatisation* process, it is often inaccessible to non-experts.

Through simplifying the user experience of the automatisation process, systems are able to make it more accessible, as we can see the pre-defined filters available in popular mobile photo-editing software such as *Hipstamatic* (2009) and *Instagram* (2010). These filters, which often emulate the characteristics of specific cameras and films, offer an easy way to quickly manipulate digital photographs through pre-determined effects. These allow even the layperson to distinctively modify the photograph, with novel and often unexpected results, increasing the engagement between photographer and photograph.

However, we observed that the usage of theses filters was mostly concerned with the formal qualities of the image and didn't challenge its perception nor its subject, greatly reducing the potential for true novelty. We believe that this as due to the absence of an initial moment of surprise that could trigger a moment of defamiliarisation (Shklovsky 1917) of the image. In the case of *Instagram*, one of the most popular applications for mobile photography, it is the user who chooses the filter, as such, the rela-

tionship between expectancy and end-result is never challenged as the user is always presented with an image that is nearly identical to the one displayed in the screen when taking the photograph, and the choice to apply the filter came consciously and knowingly.

In order to test this hypothesis, we developed *Filtershuffle*, a mobile photography application that removes the steps between photographing and applying image filters. By introducing randomness to the image transformation process and, through it, removing the "burden of choice" (Leong, Vetere, and Howard 2008) from the user, we are able to reintroduce unpredictability to the process, which could lead to creative or serendipitous experiences through the juxtaposition between what is perceived in the photographing moment, and the surprising result of the random manipulations.

Figure 1. Some of the different, randomly generated results of Filtershuffle.

5.Randomisation

With *Randomisation*, the system utilises randomness or pseudo-randomness on a possible result or outcome in hopes to provoke a sense of unpredictability.

While *Generative Systems* may utilise a randomness component, this isn't a pre-requisite, while in this method we focus on the process of randomness as a means to introduce unpredictability. Likewise, while the aim of *Generative Systems* is the creation or production of artefacts where the interactor is often the designer of the generative system and randomness is a method to achieve the generative process, in this case, randomisation is they key factor in the experience.

There is a long history of employing methods of randomisation as a way to derive meaning from randomness. The *I Ching*, *Sortes Homericae* or *Tarot*, all used a form of chance as to remove the control of the agent.

In computational systems, the computer takes the role of the *diviner*, it is, literally, the *medium*. Here, randomisation is utilised as a method to add meaning, taking advantage of the human tendency to see patterns in noise.

By choosing to release control of the interaction through *Randomisation*, the user opens the experience to allow for surprise, unpredictability and, ultimately, serendipity, as observed by Leong (2008) on consumption of media (namely music) when using the shuffle functionality of a media player. Leong's argument is that the necessity of having to choose what to listen to within a large musical library can be "unpleasant and even paralysing", particularly when the user doesn't have a particular preference. As such, by abdicating their ability to choose what to listen to, it can lead to better user experience, an enriched listening experience and even encourage "encounters with serendipity". This also encourage the interactor to create relationships between the different objects, as observed by Leong, noting that "when familiar

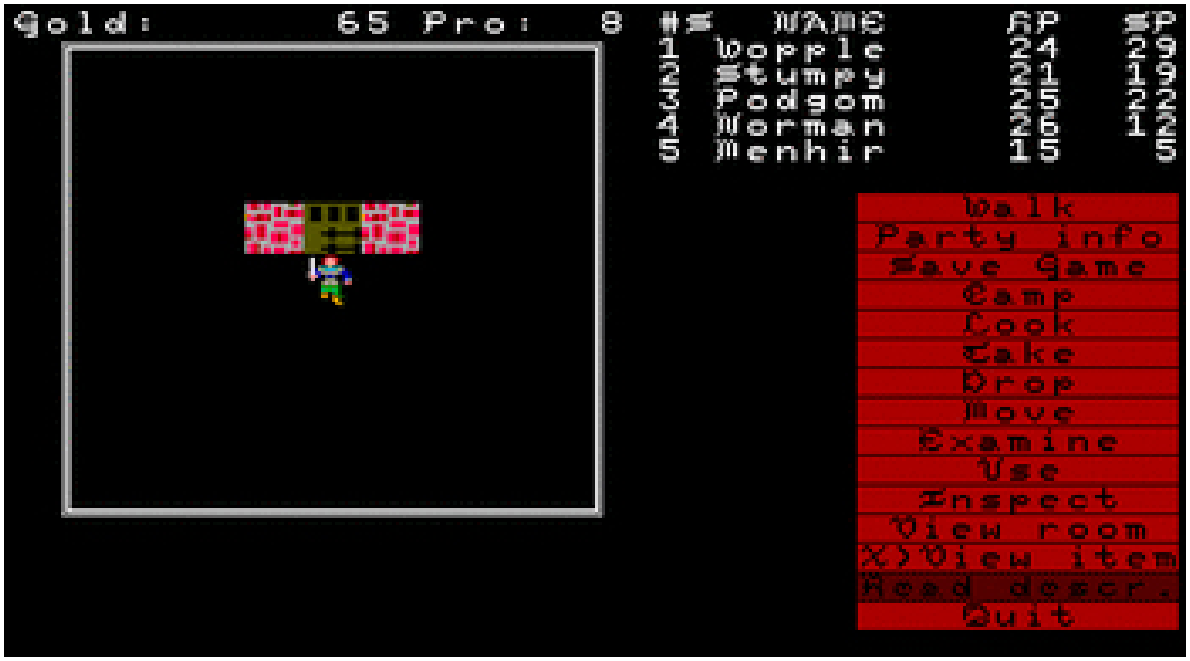

Figure 2. Demon's Winter (1988).

tracks are presented to listeners unexpectedly [...] listeners perceive the evocations of these familiar and personal associations as being slightly different, unfamiliar or even strange." (Leong 2009). As such, systems that juxtapose content through this Randomisation enable and entice the user to draw connections and, through those, add meaning to them.

The same principle of abdicating choice can be seen in the website *StumbleUpon* as it relates to *information encountering* (Erdelez 1997) or, for example *100 Million Books*, a Chrome extension that randomly displays a book every time a new tab is opened in order to "help people realize the sheer breadth of smart ideas, emotional stories, and insightful perspectives out there they don't know." (Books 2017)

Randomisation is, likewise, a key mechanic in video game design, often used to introduce, in the words of Greg Costikyan, "a sense of drama":

As a source of uncertainty in games, randomness provides one thing it is not normally credited for: a sense of drama. There is a moment of tension when the dice are rolled, or the player otherwise commits himself to a course of action the outcome of which is luck dependent. When an underpowered character in a tabletop role-playing game succeeds in overcoming a fearsome foe by, say, rolling a critical hit, the player of the character is likely to experience a moment of jubilation, of real triumph over adversity—in a way that would be impossible with a system lacking random elements. (Costikyan 2013, 85-86).

The game *Demon's Winter* (1988) has procedurally generated items with randomised effects, creating this sense of unpredictability in gameplay, something that would be greatly explored in contemporary game design, such as in the Diablo series, where created items have a random variable that defines their characteristics, creating novelty when playing the game, encouraging repeated plays.

Randomness is also used to create the game world, such as the Roguelike genre, where game levels are randomly created every time the game is played, or as in Really Bad Chess (2016), a

mobile chess game where the chess pieces are pseudo-randomly distributed (player skill can affect the distribution of pieces). By randomly distributing the chess pieces, the game eschews traditional chess tactics and encourages the player to think and play extemporaneously.

6.Multiple Agents

By opening the interaction to multiple and simultaneous agents (human or otherwise), the system is relying on the unexpectedness of the crowd to introduce unpredictability to the experience. Examples of this method can be found in Tanaka et al.'s *CC-Remix*—a network-based collaborative music creation system—where up to four users in different locations were able to participate in a process of music collaboration by taking excerpts from existing songs and mixing them together, and *Malleable Mobile Music*, where using wireless ad-hoc networks and incorporating "subconscious gestures made in the act of listing" (Tanaka, Tokui, and Momeni 2005) such as gripping the device tighter or tapping along with the beat into the actual music creation.

Similarly, *Daisyphone* by Bryan-Kinns, aims towards a "novel environment for remote group music improvisation" with the aim to understand how musical environments can be designed to be more "engaging, social and serendipitous" (2004).

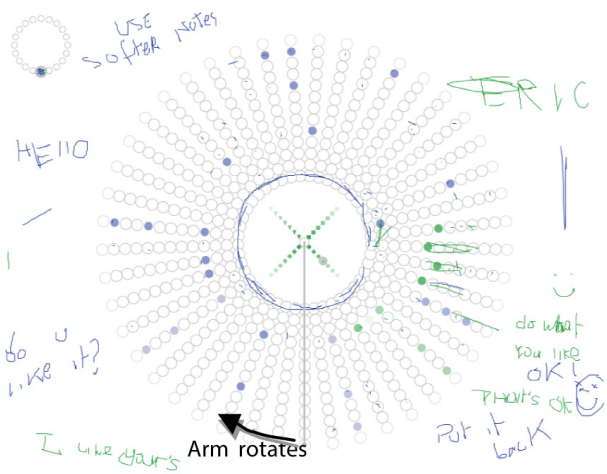

Figure 3. *Daisyphone (2004) interface.*

Starting with the premise that music has lost a fundamental part in our daily lives, being relegated to a "highly stylised activity requiring serious practice, performance, and accuracy", *Daisyphone* is positioned as a means to reintroduce the "everydayness" into music, through remote group music improvisation, through the use of mobile devices (such as mobile phones or tablets). To this end, *Daisyphone* adopts a unique interface that distances itself from conventional GUIs, opting instead to represent music as a circle, with a play head that rotates, playing the notes underneath it. These notes are placed and removed by the users, by clicking on the small circles. When joining a *Daisyphone* session, a player is given a unique hue that represents her. Different musical sounds can be selected, represented by different shapes, such as square, round, diamond and triangle, which users can select by clicking on the centre of the system. Pitch decreases with distance from the centre and volume is represented by saturation of colour. Players are also able to easily add hand-written comments, be it notes or drawings. Through this visually rich and, possibly, "messy" interface, they hope to "encourage exploration, fun, and contextualisation".

7.Summary

Here we observed methods to delegate control from the interactor to a system, in order to provoke the experience of serendipity in the former.

To that end, we identified a series of method that allow for this ceding of control: *Generative Systems*, in which the interactor purposefully gives control to the system, in form a rule that allows for a degree of autonomy by the system, in order to create novel results beyond those offered by the initial rule set; *Automatisation* and *Randomisation*, while both methods can be observed in *Generative Systems*, they can also be utilised in other applications as ways to remove control from the interactor and allow for unpredictability; and lastly, *Multiple Agents*, in which unpredictability (and serendipity) is the

result of dividing the interaction between multiple, autonomous actors (human or otherwise).

8.Limitations and Future Work

The methods that constitute this heuristic and here described are not all-encompassing but merely representative of the most common identified methods for the release of one's control of an interaction. Likewise, this heuristic is not focused to a specific area of interaction—such as information discovery, video-games, the creative practices, or interfaces for live performances—but, due to the nature of our research, the whole spectrum of digital interactions. Further work should, therefore, figure the identification of the specific methods where the interactor cedes control within distinct areas of activity and consider how they influence the practice and experience of that activity.

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