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Ecomorphic Dialogues

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Abstract

The biological concept of ecomorphology examines the morphology of the organism in relation to the environment it inhabits. However, the organism itself is an active agent that shapes the environment that in turn shapes it. The two are linked through what autopoietic theory calls structural coupling, and thus the environment itself evolves as an ecomorphic entity. This short paper discusses modelling the process of ecomorphic evolution of an art gallery, which is built around the natural interaction, or hermeneutic dialogue, between people and artworks within it. The natural interactions from the point of view of the person are those based on active perception of the environment, that is, based solely on possiblities that the environment affords to the person. In the model presented here, the possibilities of the gallery are to view the artwork on display, and agents with vision act out the part of the people. However, the artwork itself is engaged in a game in which it tries to place itself in popular rooms within the gallery, moving from location to location to achieve this. Around this visually coupled interaction between viewer and artwork, the walls of the gallery are formed and reformed according to the location of the players, in order to create a constantly evolving space in which the game is played: the ecomorphic dialogue of artwork and art viewer.

1. Introduction

The idea for this short work is taken from a paper by Wheeler entitled "From robots to Rothko" [1]. In his paper, Wheeler develops the notion of a *hermeneutical dialogue* between the viewer of an artwork and the artwork itself, through a rejection of traditional cognitive science, and the introduction of *active perception*. Active perception considers the natural possibilities of the environment as the motivator for action, indeed, for the process of perception as a whole. The possibilities act as affordances, to which the agent within the environment is drawn. If the agent has vision, then the affordances are visual affordances of useful or interesting aspects of the environment, and the process as a whole can be thought of as natural vision. In the words of Gibson: "We look around, walk up to something interesting and move around it so as to see it from all sides, and go from one vista to another. That is natural vision." [2]. Already we can begin to understand why the process of art appreciation might be amenable to analysis by natural vision. In conducting ourselves around an artwork, we do not use a prior cognitive model of where and how the artwork should be, but engage with it directly, in a process of natural vision. Wheeler builds upon recent work in active perception, where the task an agent is involved in, or specifically, the situated interaction, is shown to be the important factor in how an agent interacts with its environment. For example, an agent with wings will fly to a post in the manner of a bee, while an agent with legs will approach the post in the manner of an ant, even if the two are evolved from

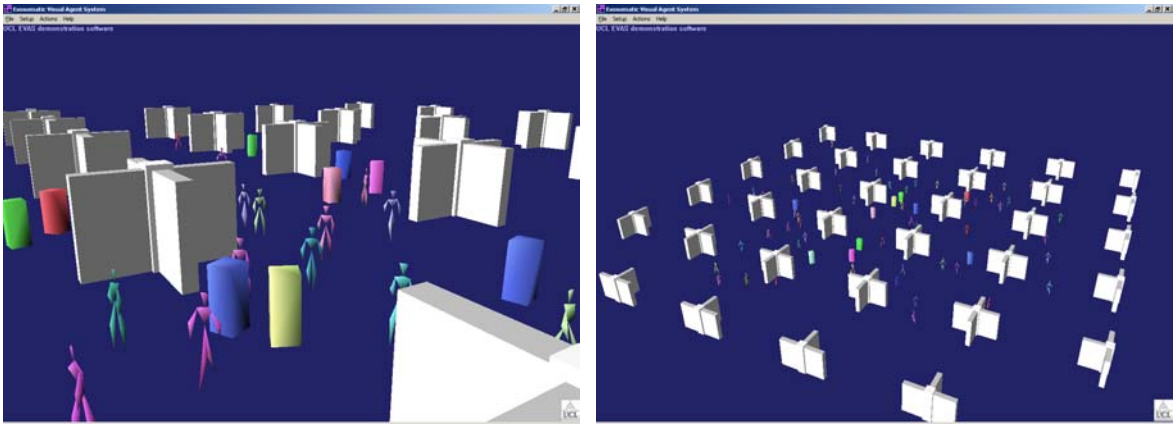

Figure 1: Viewers (people) and artworks (coloured blocks) within a 5 x 5 grid of rooms separated by columns. The colours represent the taste vectors of the agents.

neurologically identical starting points [3]. That is, for the purposes of a discussion about an art gallery, the task of viewing is the essential part of the action of viewing. Wheeler takes the idea a step further to consider what the process is that is occurring between the art viewer and the artwork in during this action of viewing. He argues that both the art viewer and the artwork essentially have an evolved history that comes together in the action of viewing. The exchange that occurs during this action is a hermeneutical dialogue — a natural interaction between art viewer and artwork.

The action we have described is, of course, a private (phenomenological) exchange between viewer and artwork. However, this private exchange occurs in a spatial setting, typically that of an art gallery. This paper aims to look at the spatial consequences of that dialogue, by means of a simple environmentally situated game. Both 'person' and 'art' are considered as actors in the game, in which the person aims to view the art, and the art aims to be viewed by the person. To set this in motion we use agents with vision of the environment who are able to move around artworks, and allow the artwork, also an agent within the system, to move either continuously or occassionally in order to place itself in view of the people. However, as the artwork situates itself the environment is modified around it, so it finds itself against a wall. As the game continues around the two organisms, the environment is coupled to their action, so it itself becomes an actor in the game, forming the possibilities of the art viewers' within the system. The game creates an ecomorphic environment: morphology is evolved around the ecological process occurring within itself: the hermeneutical dialogue between the viewer and art agents in the system.

2. Implementation

In order to realise the system, computational agents with vision are used for both the viewer and art agents. In order to allow a large number of agents with vision, an exosomatic visual architecture is employed [4,5]. This software architecture provides a lookup table to identify visible locations within the environment from any location within the environment. The agents may be released at any location within the environment and progress naturally towards any location within their visual field. This method of movement was shown to reproduce actual levels of movement of real people within an art gallery environment with considerable accuracy [5]. The underlying program we used for these earlier experiments was taken directly as the input for the agents demonstrated herein. The agents take three steps forward before reassessing their goal – any location within their field of view, and then take another

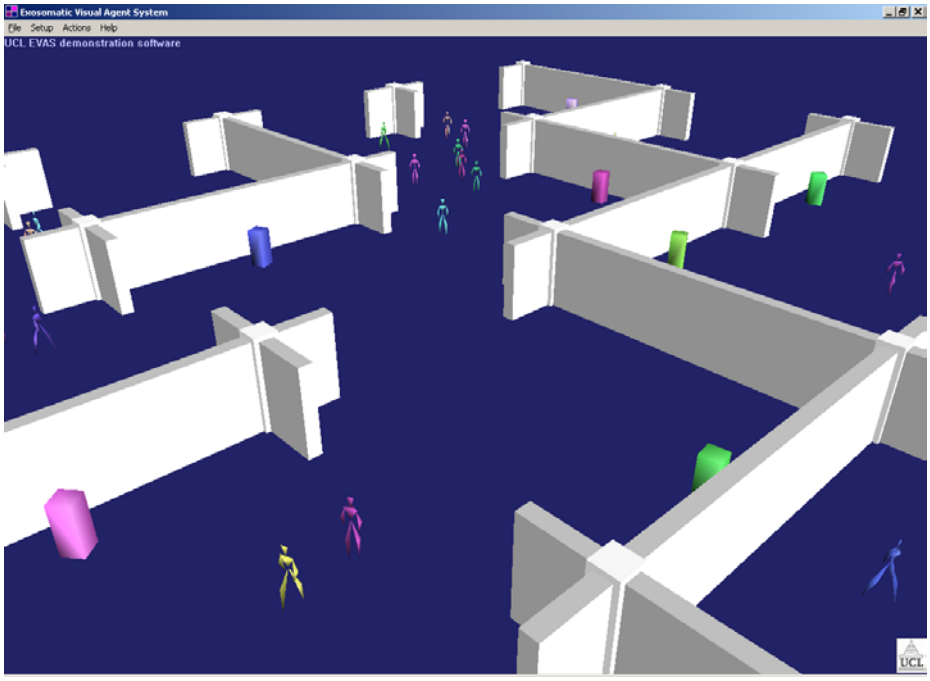

Figure 2: Viewers walk among artworks placed in random rooms. Against each artwork, a wall is formed.

three steps towards this new goal, and so on. As such, this is natural vision within an environment with only configurational interest. For the experiments here, the agents were given desires. The viewer agents like to view art: if they see an artwork within their visual field that appeals to them, they walk towards it and peruse it awhile. Whether or not an agent likes the artwork, and thus approaches it, is based on the relative direction of their *taste vectors,* as introduced by Mottram et al [6]. Taste vectors are two-dimensional vectors that represent likes and dislikes, and vary slowly around a circle as the viewer agent progresses through time, or in response to the artwork that it has seen previously. If the art and viewer taste vectors are aligned, then they appeal to each other, and the viewer walks towards that artwork, and continues to appreciate it until its taste vector moves on. Figure 1 (next page) shows viewers and artworks in a basic configuration, a 5 x 5 grid of rooms separated by columns. In this case, the artworks are either static, or simply move from room to room as they so desire, and the viewers cruise after them until their interest is satiated. The system creates the general action of an ecological game between viewer and artwork, but as it stands, creates no ecomorphic phenomenon.In order to create a morphological response, the artworks are told to stand at distinct places at the edge of each room. As they take their places, a wall is built behind them, so the artwork becomes a feature displayed against a wall. Now the viewer agents are told to move from room to room to peruse the situated artworks, as shown in figure 2. Now the situation is reversed, there is a single morphology and no evolving game between the occupants, other than a pattern of movement generated by the visiting agents.

Therefore, in order to create the morphology around an interaction, the artworks are periodically told to move from their current location and find a new, more popular location. This is achieved by recording the number of visitors to each room over time. After a period, about every 30 seconds, an artwork in the least visited room is chosen to move. As it becomes mobile, the wall behind it is removed and it is allowed to seek out a more popular room. It does this by checking the first three rooms it finds to see if they are more popular than its current room. It then finds a room, and settles in its new location, at the edge of the room, and a wall is once again built behind it, as shown in figure 3.

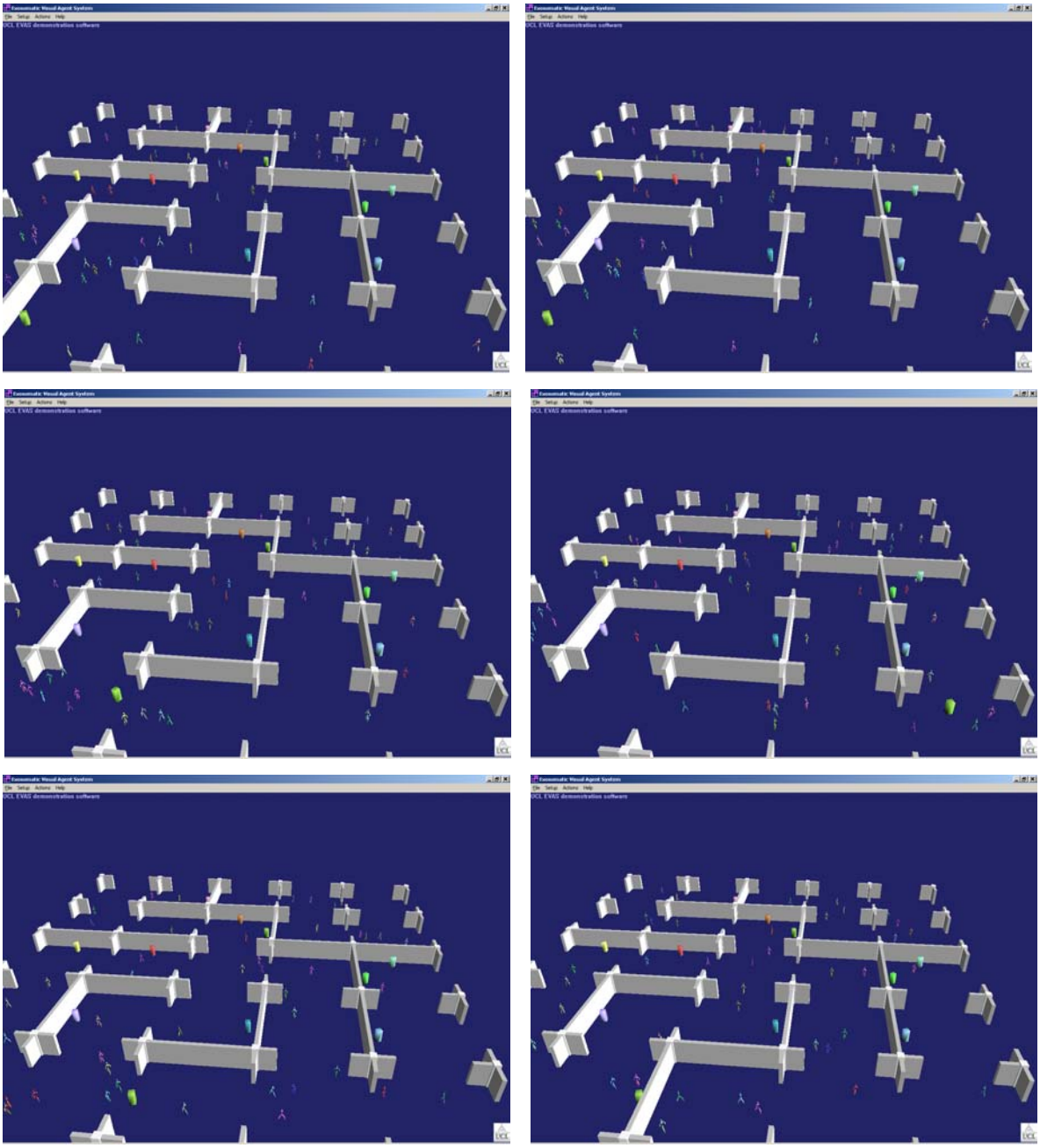

Figure 3: The artwork in the least visited room (the block in the bottom left of the first picture of the series) sets off to find a new, more popular location. It examines 3 rooms before deciding to return to its original room.

The removal of the wall and then its later addition is perhaps a trifle untidy: the reason the program is implemented in this way is entirely down to computational pragmatics. As the exosomatic visual architecture prestores visually accessible locations for rapid lookup for agents, addition or removal of configuration requires significant recalculation. Recalculation is kept to a minimum by removing the wall as the artwork

agent begins to move, and then replacing it once again as the artwork comes to its new location, without the wall being in existence for the entire time the artwork agent moves from new to old location.

3. Discussion

The system as described has only recently been implemented. It will be interesting to find out

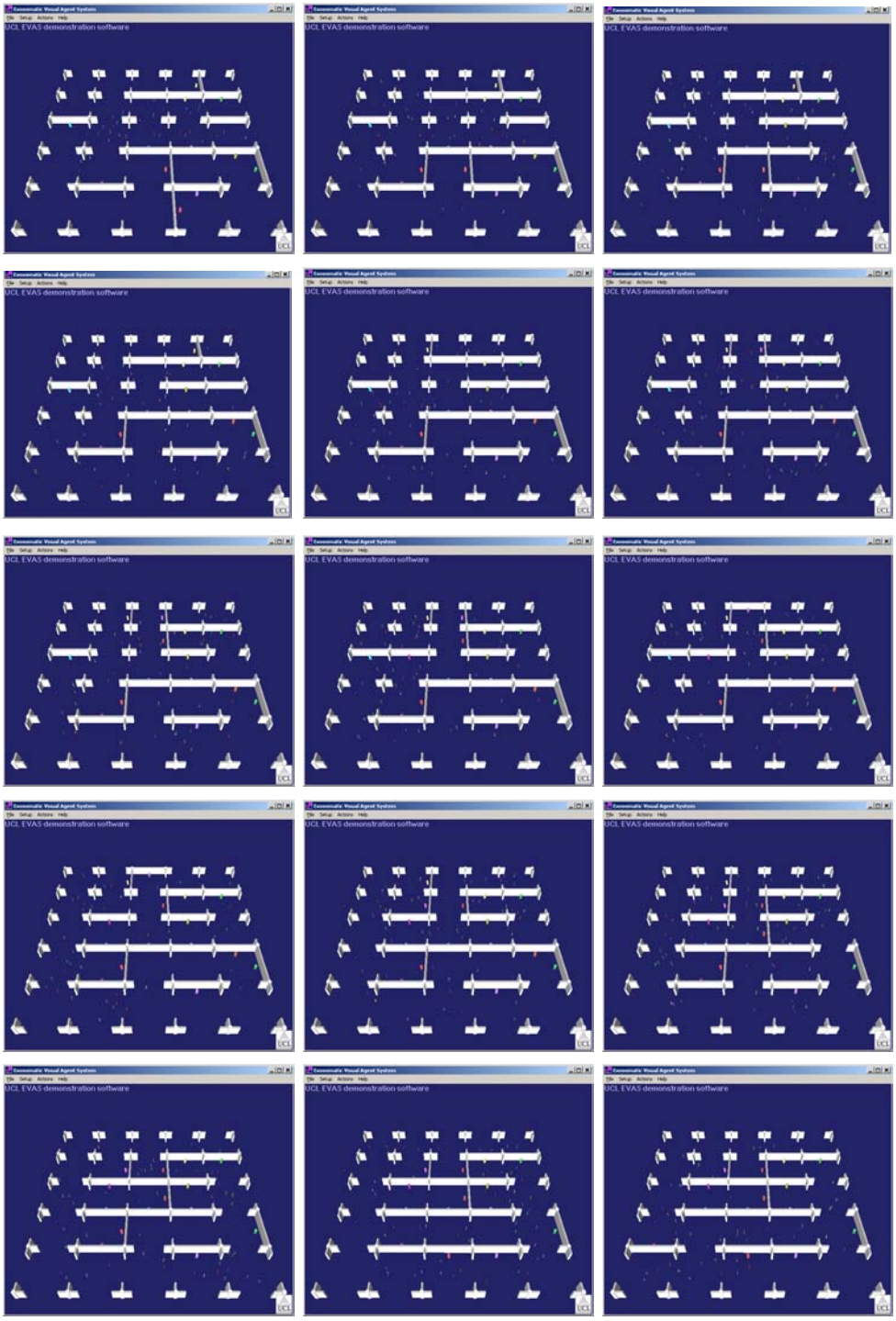

Figure 4: Stepwise wall position changes from initial random artwork positioning to a semblance of order

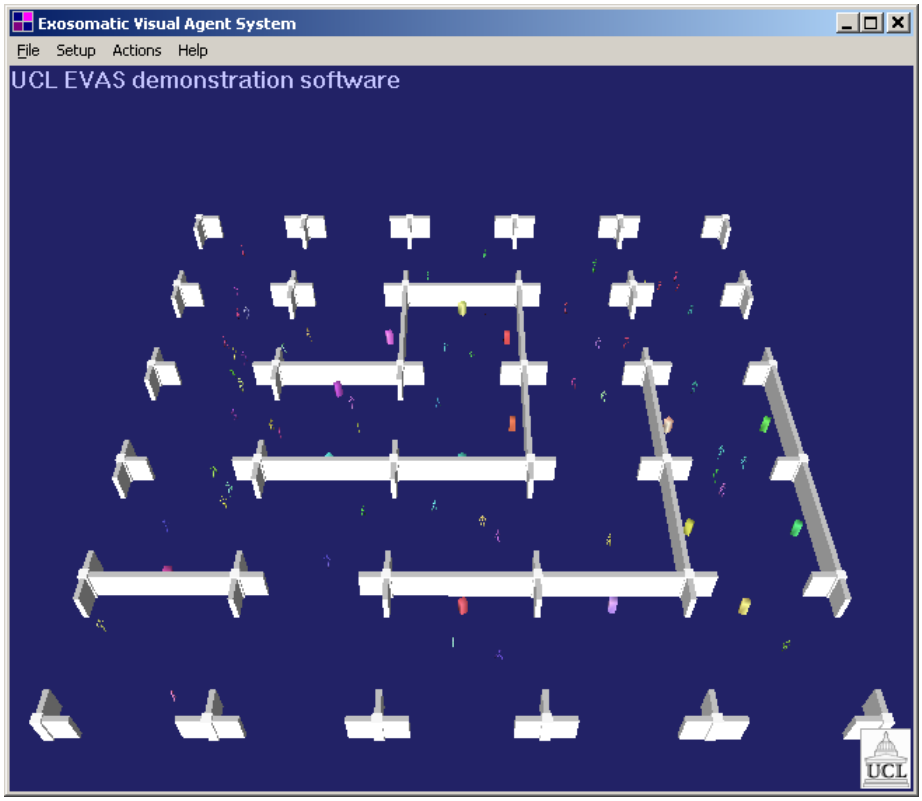

Figure 5: After several minutes more the supposed order of figure 4 has progressed to a different regime: an L-shape pattern of artworks

whether it creates self-organisational ecomorphic environments, or whether the game just plays out to create interesting but essentially random environments. Figure 4 shows a series of pictures taken as the environment develops as walls are removed and replaced. As might be expected, there is a form of emergent system arising: the artworks are slowly centralising, yet forming strict rows for viewing. The final panel, however, shows that all is maybe not as it seems: an artwork disassociates itself from the centralised row and places itself in a prominent viewable position in at the end of an open row. The system is left for a time, and by figure 5 an L-shape of pattern of artwork walls has emerged.

It is too early to tell if the patterns emerging might be the result of some underlying order parameters, or whether the patterns are simply fortuitous. Instead, what has been demonstrated here is an approach which may bear fruit in the future. The system shown here is based on an extremely simple grid structure; however, there is no reason why we might not in the future take down a building from its current format and reapply it to some process to which we might think useful, such as the hermeneutical dialogue between art and viewer in an art gallery, or the process of political debate in a parliamentary chamber. The walls can be reconfigured about the new process to create an ecomorphic environment, structurally coupled to its future task.

References

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