Composite Metaphor, Games and Interface
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ABSTRACT
Metaphors are often used within computer interfaces to provide the user with cognitive prompts of how to use the system. Using concepts related to objects with which the user is already familiar, to represent similar functions within the system, interface designers are able to provide significant cognitive scaffolding. This technique, however, usually relies on a real-world equivalent on which to base the metaphor. In some computer systems, and in computer games in particular, often there are no directly analogous objects on which metaphorical prompts can be based. This has driven game designers to utilise composite metaphors; metaphors where a combination of objects, or a combination of objects and actions, are used to provide cognitive clues. This paper examines how composite metaphor is used within computer games to articulate the designers’ conceptual model, subsequently guiding the user’s development of an appropriate and accurate mental model.

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Your general terms must be any of the following 16 designated terms: Design, Human Factors, Theory.

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Metaphor, Games, Interface, Mental Models.

1. INTRODUCTION
Conceptual models are a construct of a system created by designers; they are the designer’s view of the system that they have created. Conceptual models differ significantly from mental models in that they are static; they are constructs provided by the designer who (by definition) has a complete understanding of the system and how it functions. Conversely, mental models are a technique humans use to try and make sense of the otherwise incomprehensible, using their experience and understanding of elements of the problem. Defined by Norman [12] as “the models people have of themselves, others, the environment, and the things with which they interact…The mental model of a device is formed largely by interpreting its perceived actions and its visible structure”. Researchers have investigated the link between the use of metaphor within computer systems and the effective formulation of mental models [1] - [3], [7] - [11], [13]. However, what much of this research has underestimated is the increasing complexity of computer systems and the resultant lack of analogous objects on which to base metaphorical prompts.

This increasing complexity has led to another classification and utilisation of metaphor within interface; that of the composite metaphor. “A combination of metaphors that are not necessarily related to each other but together represent the structure of the system” [14], composite metaphors differ from traditional interface metaphors through the inclusion of action as well as object as the basis of analogy, or through the combination of several familiar objects, and associated attributes, in order to provide cognitive prompts. A natural extension of the interface metaphors currently used in many computer systems, composite metaphors are frequently implemented within computer games as a way of aiding the user in the creation of an effective mental model. This is particularly evident in fantasy style games, or where games are set in a non-reality based context.

Composite metaphors are not new. It has been suggested that the scrollbar is in fact a composite metaphor, as it combines the action of unrolling a scroll with the metaphor of a window [13], thereby creating a composite metaphor that, nonetheless, provides cognitive clues to the function and purpose of this system function. What is noteworthy is the increasing use of composite metaphor within computer games to enable cognitive support for learning how to use a game.

2. METAPHOR, CONCEPTUAL AND MENTAL MODELS
Metaphor, and composite metaphor, within an interface utilises the idea that users recognise concepts more easily than they can recall them [6], [13]. Game designers use metaphor and composite metaphor to exploit this phenomenon in order to influence how a user’s mental model is formed. By presenting new concepts in the form of a familiar metaphor, or composite metaphor, users can apply models already associated with objects and, in turn, quickly apply these to unfamiliar artefacts or scenarios experienced in the game. This facilitates the formulation of in-game mental models, which can then be reapplied and refined; an essential element in
It has been suggested that “users should be provided only enough instruction to get started and keep going (within a game)” and “users should be able to learn how to begin using the application quickly and with minimal effort” [5] are two guiding principles of effective design for computer games. Providing the user with cognitive scaffolding, by aiding in the appropriate formulation of a user’s mental model, metaphor and composite metaphor enable just these goals. An effective mental model negates the need for users to actively learn how to interact with a game; interaction is intuitive, as the metaphor or composite metaphor allows the user to recognise concepts with which they are already familiar and quickly apply these ideas to the new situation. Provided the metaphor is appropriate, there is less need for complicated instructions, and the user is able to immediately start interacting with the game. In this way the game designer can transfer elements from their conceptual model to unobtrusively guide a user.

Using metaphor and composite metaphor as a method of transferring information from the designer to the user also allows that a user’s mental model of a system is rarely complete. Davidson [3] states “A mental model contains minimal information. It is unstable and subject to change. It is used to make decisions in novel circumstances”. Metaphor can be used effectively at different stages throughout a game to further add to the user’s mental model of the system, and as such increase their understanding of game dynamics and how to play the game. In other words, a user’s mental model of the game will necessarily change throughout the game, dependant on the additional information they receive. What may start out as a basic understanding of how to interact within a small section of the game can be developed relatively quickly into an advanced and sophisticated understanding of the game, its objectives and environment, as the user’s mental model grows to reflect the additional information discovered through gameplay.

3. COMPOSITE METAPHOR IN GAMES

The way in which composite metaphors are articulated within games necessarily depends on the genre of game and its backstory. For example, implementation of composite metaphors in a car racing game using a steering wheel and pedals, where there is already some direct correlation between the game’s controls and the real life objects upon which they are based, is likely to be very different to the way they are implemented in a space based fantasy game where the user is interacting with a custom set of controls and concepts with which it can safely be assumed they have had no direct experience. Because, in many instances, metaphor is used to facilitate user interaction with the system itself, composite metaphor can vary dramatically between games and genres. Fantasy games, or games set within a non-reality context, tend to utilise composite metaphor more heavily than other styles of games, although that being said it is possible to find implementations of composite metaphor in almost every game genre and theme.

In Gas Powered Games’ ‘Dungeon Siege’ a prominent implementation of composite metaphor is the character’s inventory. Set in a magic medieval world, the user’s character fights magical beings and animals in order to save the realm from evil. In order to fight these beings, the character has an inventory that the user equips with a range of weapons, spells, potions, magical objects and money. The character’s inventory is used as a repository for, and the primary mechanism for changing, the tools and weapons the character uses within the game.

![Figure 1. Screen capture from Gas Powered Games’ ‘Dungeon Siege’](Image)

The inventory utilises several metaphors to prompt the user about its function. For example, while the inventory itself uses the idea of a bag, which the character carries around to contain their equipment, it combines this idea with a mannequin panel where the user can ‘dress’ and ‘arm’ the character with different items of clothing, magical rings, amulets and weapons. While these two concepts (a carry bag and a mannequin) are not of necessity associated in a real world context, even without it being explicitly stated, within the game environment it is obvious that in order to change the character’s equipment, the user must equip the mannequin from the contents of the inventory.

Also included within the inventory is a spell book, which the user can equip with spells. The spell book is itself an interesting use of composite metaphor within the larger inventory metaphor. Using the familiar concept of a book, in which the character keeps a variety of spells, different spell books can be loaded onto the mannequin figure of the character and the spells within these individual books accessed by the user using shortcut keys throughout the game. However, corresponding with the real world, only the loaded spell book (the one the character is ‘carrying’ or currently equipped with) can be opened. For a user to enable the character to access any other spell book the character may have in their possession, they would need to open the inventory (the bag) and use the mannequin metaphor to replace the character’s existing spell book with the new one they wish to utilise. This is an example of how composite metaphor can combine both attribute and action in order to provide cognitive prompts.

By their nature, books are read independently of one another: it is impossible to actively read two books at exactly the same time. It makes sense that the user could instruct the character to quickly flick between spells in a spell book that they were carrying (in much the same way one can flip between different sections of a physical book). However, following the attributes of the book metaphor upon which this artefact is based, it makes sense that in order to access spells stored in a different spell book, this book
would need to be independently accessed. In a real world context this would be by putting down the original book and picking up the new one. Within the game context, this would be by getting the new book out of the character’s inventory bag, and equipping the character with the spell book via the inventory metaphor. In this way, the game’s spell book metaphor uses familiar ideas of reading, the ability to quickly access sections within a book and the attribute that only one book can be read at any one time.

While ‘Dungeon Siege’ uses composite metaphor as a method for the user to facilitate interaction with the system, other games use the technique purely for the provision of information and feedback to the user. In Splash Damage’s ‘Wolfenstein Enemy Territory’ the user’s character is a soldier in the Second World War. Playing within a multiplayer online team, the user’s character fights campaigns against an opposing team in order to secure battlefronts. There are a variety of scenarios within the game, each with its own objectives and terrain. Campaigns are won by a team achieving their objective for that scenario. Opposing teams have different objectives, and by moving through the terrain and interacting with other players and objects within the game environment, users endeavour to further their team’s objective. As such, effective navigation through the game space is of premie importance to the success or failure of campaigns, and victory or defeat for characters and the team.

‘Wolfenstein Enemy Territory’ uses a composite metaphor to further the user’s navigation within the gameplay. The navigation instrument at the top right corner of the interface combines the familiar objects of a map and a compass in order to provide the user with a real-time cartographic view of the game terrain. While in real life there is a pre-existing association between an aerial map and a compass (the two artefacts are often used alongside each other to facilitate navigation), in ‘Wolfenstein Enemy Territory’ the implementation of these two objects into a single device, and the fact that any movement by the user is immediately reflected by the instrument, gives the user significant cognitive clues about its function and use.

As well as providing the user with a method of navigation, this composite metaphor is interesting in that it exploits the likelihood of both objects, a map and a compass, existing within a real-life battle scenario such as that represented in the game. Neither of these objects, individually, appears incongruous with the back-story or theme of the game. Despite the fact that the combination of these tools into a single instrument is inconsistent with technology available at the time in which the game is set, because the user is familiar with both concepts, and would expect both to appear in the game in order to aid in navigation, they can immediately determine the function of the composite metaphor.

While ‘Wolfenstein Enemy Territory’ uses composite metaphor to create one element within the overall interface set-up, Egosoft’s ‘X2 The Threat’ uses a combination of metaphors for a significant proportion of their interface and gameplay environment. In ‘X2 The Threat’ the user’s character is a rogue pilot within the X universe who is saved from a life of servitude in a mining camp, after being caught stealing a ship, in order to work for the TerraCorp corporation. Being a pilot, much of the character’s time within the game is spent within the spacecrafts he operates, and it is in this environment that composite metaphor is extensively used.

Each of the various spacecraft interfaces available throughout the game use metaphor to enable the user to interact with the spacecraft and the X universe; the spacecraft uses the idea of a cockpit, similar to that of a fighter jet, where the user is able to direct the craft as well as monitor relevant statistics such as position, ship health and power. Although it is probable that the user will never have encountered a spacecraft console, and despite the fact that in reality such a console is likely to be significantly different to the interfaces presented within the game, because of the metaphoric analogy between the spacecraft interfaces and the more familiar concept of an aeroplane cockpit and console, the designer is able to transfer ideas from their conceptual model about the these interfaces and their mechanisms.

Within the larger cockpit metaphor exists an interesting composite metaphor of a 3D navigational radar. The red panel in the bottom centre of each of the spacecraft interfaces is a radar, presented in typical 2D mode. The same information is also replicated in the 3D radar positioned in the bottom right of the screen. The 3D radar combines the familiar concepts of a 2D radar with that of a 3D compass, enabling the user to get a 3 dimensional view of the craft’s orientation and relative position to other objects and destinations within the immediate vicinity.
4. CONCLUSION

The above examples demonstrate that composite metaphor is being used, and being used effectively, within game design and game interfaces to facilitate the effective formulation of the user’s mental model, and to make games easier to use and interact with. This poses the question of whether composite metaphor can be, or has been, utilised in other computer interface designs.

For example, has composite metaphor been used in a substantial way within commercial word processing or spreadsheet applications, and if this implementation has not already taken place, then why not? If composite metaphor is being used in games to provide cognitive scaffolding in order to aid the formulation of the user’s mental model, would the utilisation of composite metaphor by the larger interface design community make learning and using other computer applications easier and more intuitive?

Following on from the idea of utilising composite metaphor in a non-games interface setting, my research seeks to identify whether other interface design principles exist within games that may be relevant to non-games interfaces. The next phase of this research project is involved in investigating further what design principles make computer games so easy to learn and play, with a view to understanding the potential/actual application of these design elements within non-games interfaces. The overall goal is to identify these principles in computer games, discover their utilisation or potential utilisation within non-games interfaces, and finally develop a method to measure their effect on usability in order to determine whether interface designers should be looking to computer games to make their interfaces easier to learn and understand.

REFERENCES