In information visualisation, zoomable user interfaces (ZUI) were developed in order to navigate in a big information space. They have an infinite space and allow the manipulation of infinite pans and zooms but the main drawback is the risk of getting lost in the information space. Understanding how a human being perceived the scale changes and how he is living this “zoomable” experience will help to avoid the user disorientation when he manipulate this kind of interfaces. While basing on ecological and enactive theories, we will try to bring some elements of responses in order to understand the navigation in ZUI.

Introduction
The far distance and the invisible have always fascinated the human being because he has seen something which exceeds him, fascinates him and frightened him to some extent. From the moment where the human equipped himself with instruments enabling him to approach the far distance and to increase the invisible, he has widens his space of exploration. Since the advent of the optical instruments, we pass from the “closed world” to “the infinite universe”; our personal space is decompartmentalized and can extend ad infinitum dint to this abolition of the distances which involve a compression of time at the same occasion. Thus, the individual falls in a new relation with his world and organizes his perception according to these new elements which surrounds it. Thus, the zoom is a “new” perceptual experience which was registered in the human collective with the advent of the technique. Accordingly, to perceive is “to enact”, it is to “self-organize” according to the external elements which come disturb our former perception [8,9]. Thus, human perception has changed and was self-organize with the advent of the zoom which was bringing by powerful tools like microscopes, telescopes, cameras and also computers.

Zoomable User Interfaces (ZUI)
ZUI were designed to visualize a large quantity of information within a limited space (that of the screen), which remains problematic with a classical WIMP (Windows, Icons, Menus, Pointer) display [1]. PAD [7] was one of the first ZUI realized by Perlin and Fox in 1993. It led to PAD++ in 1994 [2] and Jazz in 2000 [3]. There space is infinite in length and width, which allows the user to employ infinite pans and zooms in order to navigate in this multi-scale space. In contrast to a geometrical zoom, the zoom used is a semantic zoom. The semantic content of the page is modified with each scaling, i.e. the detail level and the object representation are different at each level of zoom. But with “desert fog [6], the user is lost in the space of scale and forget his/her course during the navigation.

Zoom and Enaction
The perception which one has of an object in the world is relative and own to each. During the navigation in a ZUI, the “zoomable” perceptual experience of the subject follows an enactive process, i.e. the zoom takes its significance in the action of the subject which results from the engagement of the subject in its activity. That is as if the subject is climbing a ladder and its rungs were built during his climbing. This metaphor debriefs the concept of enaction [9]. The “zoomable” world is enacted by the subject, i.e. it is built in the action which he builds with each level of zoom. A perceived world (real or virtual) is narrowly dependent on who is perceiving it and who is engaged, at the same time, by his body and his spirit “...cognitive faculties are inextricably related to the history of what is lived, in the same way that a path
with the non-existent precondition appears while walking" [8]. This path which appears while walking, while zooming in our case, is navigation on the axis of the scales [4].

**Zoom and Ecology**

The concept of affordance [5] can be widened to a virtual world displayed behind a computer screen. For zoomable user interfaces, they afford the depth since we have the impression of “travel” in the dimension of the scale.

Two zoomable experiences are possible: i) the experience of the traditional zoom, which corresponds to an increasing of the object’s size, ii) the experience of the continuous zoom (made possible with optical instruments, camera, etc.). When I use this zoom, I consider that I approach the object or that it approaches of me without considering that the object becomes larger relatively to me, i.e. I maintain “the size constancy” of the object. That is as if I have shrunk the distance which exists between me and the object.

The semantic zoom, used in zoomable user interfaces enables me to live the two experiences. When I zoom on an object, I handle some levels of zoom before the change of the semantic contents, i.e. the object does not change appearance during a series of zoom. This first phase of handling is lived like an enlarging of the object’s size. From the moment where the semantic contents is changing, I am aware of perceiving the object with more details and thus of advancing in the depth for better perceiving it, the object approaches of me (or I approach of it) and thus navigation is done in two steps: A navigation "without depth" and a navigation "with depth" which can be considered as an extension of my body on the axis of the scales. In other words, from the moment when I conceive a depth, an axis of the scales, I live it as moving closer. But if I do not feel the depth, I live it more as an expansion of the object. Having given access to the depth, a ZUI simulates the affordance of locomotion since I have the impression of approaching the object (or the object is approaching of me), whereas a "traditional" zoom do not affords displacement since I do not have this feeling of navigation in the depth.

**Bibliography**