7

Visual Design Methods in Interactive Applications

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Visual design in general is the arrangement of information items (e.g., text, images, diagrams, pictures, tables) in such a way that the resulting product is visually attractive, perceptive, and easily understandable. Visual design issues are raised in many domains of human activity such as user interface design, documentation development, presentation design, and graphic layout. This chapter describes techniques coming from traditional visual design and discusses them in the context of user interface design.

When the designer sketches the components of a user interface, she or he first selects appropriate interaction and interactive objects according to the user's task (Vanderdonckt & Bodart, 1993). The second activity is to determine the basic layout of these selected objects ranging from the most important to the least important: the main application window, the title and menu bars, the functional areas of the application window (e.g., a status bar, a toolbar), all child windows, dialog boxes and panels with their contents.

This layout (figure 7.1) consists of interaction objects and interactive objects. Interaction objects (IO), also called widgets or controls, encompass static objects (e.g., labels, separators, group boxes) and dynamic objects (e.g., edit boxes, radio boxes, option boxes). Interactive objects cover every kind of object that a multimedia user interface could display: static icons, drawings, pictures, images, sketches, video sequences, graphics and so forth. Each of these objects allows some special interaction with the user. For instance, an image of the human body may include hot spots for defining different sensitive regions of the body in order to be selected, displayed, explained, or zoomed. Some images can be extracted from a video sequence in order to be analyzed. Interaction and interactive objects are henceforth referred to as IO.

Determining a basic layout consists of calculating and drawing any geographical composition of functional areas of the user interface into a comprehensive format depending on the user's task. In particular, solving the layout problem for a dialog box consists of drawing the set of related IO, assembling them into a rectangular area, and surrounding them by borders. The layout then looks like a set of rectangles when drawn around each IO (figure 7.1a). A *layout grid* consists of a set of parallel horizontal and vertical lines that divide the layout into units that have visual and conceptuel integrity (de Baar, Foley, & Mullet, 1992; Feiner, 1991; Marcus, 1992; Taylor, 1960). The intersections of these lines delimit these units into rectangles that constrain the IO position (figure 7.1b). Equally spaced lines typically establish external margins in the layout and consistent space between the different IO. Layout grids are very practical for form fill-in user interfaces and for text displays since their IO reflect the layout of the source doument or the page of a book (Hurlburt, 1978; MüllerBrockman, 1981). Such a layout grid can be applied for both the background and foreground of screens, as in HyperCard (Apple, 1992).

The problem comes from the fact that in modern user interfaces, these grids are no longer as useful because the layout no longer consists of vertical and horizontal lines. Instead of these kinds of lines, the layout may be based on other lines (e.g., oblique lines, discontinuous lines), convex shapes (e.g., lozenge), planes (e.g., a plane with a vanishing point), and volumes (e.g., cylinder). Therefore, we extend the definition of a layout grid to include a *layout frame.* A layout frame consists of dots, lines, shapes and volumes that constraint the localization of IO. Deciding such a complex layout frame is not an easy task. To help the designer do this job, several visual techniques are now described.

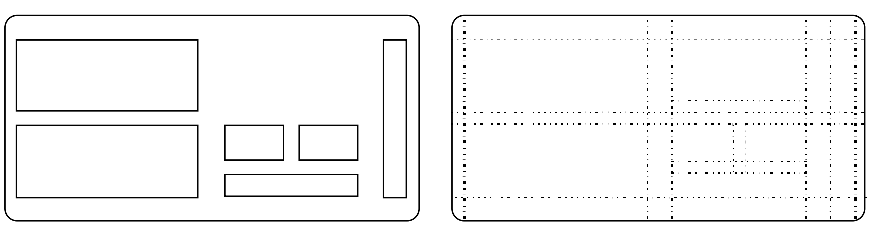

Figure 7.1. (a) A layout of a dialog box; (b) The underlying layout grid

Definition of visual techniques

A *visual technique* relies on a commonly accepted visual principles to suggest the arrangement of the layout frame components. The visual techniques listed in this section are sorted by similarity and not by rank of importance because we are convinced that all visual principles cannot be applied with the same representativeness. Some principles are very easy to apply, some other are more difficult to deal with, and some other become very hard to translate. Moreover, applying this or that principle mostly depends of the involved IO and the visual aims that the designer has in mind. Visual techniques can be grouped into five categories:

- *Physical techniques*: balance, symmetry, regularity, alignment, proportion, and horizontality.
- *Composition techniques*: simplicity, economy, understatement, neutrality, singularity, positivity, and transparency.
- *Association and dissociation techniques*: unity, repartition, grouping, and sparing.
- *Ordering techniques*: consistency, predictability, sequentiality, and continuity.
- *Photographic techniques*: sharpness, roundness, stability, levelling, activeness, subtlety, representation, realism, and flatness.

These techniques are discussed further in the next sections.

Physical techniques

Balance is a highly recommended technique evoqued by many authors (Dondis, 1973; Dumas, 1988; Galitz, 1989; Horton, 1990; Kim & Foley, 1993). Balance is a search for equilibrium along a vertical or horizontal axis in the layout. If a weight is attached to every IO, balance requires that the sum of IO weights on each haxis remains similar. *Instability* is the opposite of balance where IO are not distributed equally on the axis. "They seem ready to topple over" (Galitz, 1989). Balanced layouts are not only easy to understand, but, also, easy to design by a game of counterpoise. If an IO is placed to the left of the vertical axis, instability is provoked and immediately countered by adding an IO of the same weight to the right of the vertical axis.

Balance does not have to take the form of symmetry. Balance can be realized through symmetry and asymmetry. Symmetry provides a balance to the layout by centering titles, headings on both sides of the axis, by placing two columns of equal length, one on the left, one on the right. The weights of IO can be adjusted asymmetrically (Dondis, 1973), although it is technically more complicated to reach a balance with dynamic asymmetry than with static symmetry. Reaching asymmetric balance is a matter of weight, size, and position.

Symmetry (Dondis, 1973; Galitz, 1989; Kim & Foley, 1993) consists of duplicating the visual image of IO along a horizontal and/or vertical axis (e.g., left on the right, top to bottom, or vice versa). Achieving symmetry automatically preserves balance, but the balance can be performed without symmetry. Symmetry is very simple to verify and logical to imagine, but can lead to static layouts without originality (Dondis, 1973). The opposite of symmetry is *asymmetry* where at least one IO does not possess a replication on the other side of the axis.

Regularity (Dondis, 1973; Galitz, 1989) is a visual technique establishing uniformity of IO placed according to some principle, method, convention that does not change from one layout to another. For instance, a layout where IO are uniformly spaced in columns and rows is described as regular. *Irregularity* occurs when no such principles, method or convention exists, when no logical order of IO is apparent. Irregularity emphasizes unexpected, unusual, and unconforming layout grids (Dondis, 1973).

Alignment (Kobara, 1991; Mullet & Sano, 1995; Streveler & Wasserman, 1984) is probably the most accessible and practical visual technique. Alignment occurs when the number of vertical alignment points in a row and the number of horizontal alignment points in a column is reduced or minimized. *Misalignment*—the opposite of the alignment—occurs when the number of alignment points is greater than one. Misalignment is accentuated when all IO containing task's data are placed just after their identification labels. Fonts with descenders and ascenders may affect alignment of similar IO if badly used.

Proportion (Dondis, 1973; Galitz, 1989; Kim & Foley, 1993; Marcus, 1992; Mullet & Sano, 1995; Tufte, 1983) describes an aesthetically appealing ratio between the dimensions of IO (often composite IO). Because dimensions exist in the real world, we can feel them, we can see them, we can compare them. The ratio is calculated by dividing the height of an IO by its length. Several proportions have been either proved aesthetic (e.g., the Golden Ratio) or widely and conventionnally preferred (e.g., 1:÷2, 1:2, 1:1.29, 1:1:5, 1:4/3, 1:1.6 as recommended by Marcus (1992) and Tufte (1983)). *Disproportion*—the opposite of proportion—is implied at the time no special ratio is used or a large difference appears between the two dimensions.

Horizontality (Dondis, 1973) is a corollary of the previous technique: layouts with greater length than height (i.e., a horizontal ratio) are predominant. *Verticality*—the opposite of horizontality—occurs if layouts have greater height than length (i.e., a vertical ratio). Horizontality is generally preferred over verticality in user interface design.

Composition techniques

Simplicity (Dondis, 1973; Galitz, 1989; Mullet & Sano, 1995; Tullis, 1981; Tullis, 1983) is directness and singleness of layout, free from secondary complications or sophistications. Simplicity often improves the ease of understanding in a layout. Simplicity is guaranteed by placing IO according to a logical and natural arrangement (e.g., by frequenye, by physical property) driven by the task's semantics. *Complexity*—the opposite of simplicity—increases visual intricacy with too many objects and hinders any organization of the layout grid. Tiled IO are considered a simple layout; varying overlapping IO are considered a complex layout.

Economy (Bowman, 1968; Dondis, 1973; Galitz, 1989) is the frugal and judicious use of IO in the layout to present information as simply as possible. Economy can be pursued when necessary and sufficient IO are placed in the layout, and nothing else: no IO that are extraneous to the user's task. The aim of economy is the fundamental visual layout, emphasizing the conservatism and understatement of the poor and the pure (Dondis, 1973). Economy is intended to define the boundaries of necessity within which it can work sucessfully (Bowman, 1968). *Intricacy*—the opposite of economy—occurs when unfrequent, unwanted IO encumber the layout, visually or not. This situation particularly occurs when highly detailed or digitized images with a lot of decoration are placed rather than simple IO that are reduced to the essentials and whose important features are the only salient ones.

Understatement (Dondis, 1973) and its opposite, exaggeration, are equivalent to the couple economy/intricacy, but in the domain of intellectual, mental representation rather than physical, spatial representation. Understatement supposes that the viewer of the layout is able to deduce a maximum of information from a minimum of IO to be presented. The verbal counterparts of understatement is euphemism and ellipsis (i.e., the art of saying many things with few words). *Exaggeration* shows in the layout a minimum of information with maximized IO. The verbal counterpart of exaggeration is hyperbole. Exaggeration is achieved through extravangancy, amplified expressions that are enlarged far beyond possible.

Neutrality (Dondis, 1973; Horton, 1990) A neutral atmosphere in the layout is obtained by placing all IO at the same level, with the same presentation attributes (or, at least, with little variations) as much as possible and, preferably, with no highlighting method (e.g., no blinking, no underlining, no bolding, no boxing). *Accent*—the opposite of neutrality—is equivalent to the rendering of any highlighting method on a particular IO against a sameness of background. Most graphical highlighting methods are useful: reverse video, color, brightness, boldness, boxes, borders, different sizes, overprinting, magnifying (Horton, 1990).

Singularity (Dondis, 1973) is the focus of a layout on one separate and solitary IO, unsupported by any other IO or composiion of IO. Specific emphasis is conveyed on a simple IO, despite the presence of other IO. *Juxtaposition*—the opposite of singularity—expresses an interaction between IO placed side by side or to be compared with an activated relationship or to be related by any visual technique.

Negativity (Dondis, 1973; Horton, 1990) displays IO in dark colors on a light background. Black IO (text, separators, labels, files) and colored IO (bitmaps, images) are generally displayed on a white or grey layout. *Positivity*—the opposite of negativity—displays IO in a bright color on a dark background. If negativity has been experimentally tested to reduce errors and reading time, to increase subjective satisfaction and legibility, positivity may still be used to convey special atmospheres, often with light IO (e.g., grey pictures).

Transparency (Dondis, 1973; Staples, 1993) means a visual layout where IO, superseded by other IO, can still stay visible behind or through them. Transparency is typically mandatory when displaying text on a colorful picture. A light transparent surface (e.g., grey or blue) is added between the text and the picture to improve the legibility of the text and to allow, in spite of all the visibility, the picture behind the text. *Opacity*—the opposite of transparency—means the complete blocking out, concealing of IO that become visually occulted. Having partially occulted IO force the user to guess what IO (part or complete) are hidden. Opacity can also be used to give the impression of a relative distance or depth (see depth below) legislated by overlapping.

Association and dissociation techniques

Unity (Bowman, 1968; Dondis, 1973; Galitz, 1989) is the placement of individual IO into one totality (e.g., a window) that is visually all of a piece. With unity, all IO seem to belong to each together and to be bound so that they can be seen as a whole and taken as one sealed unsectile thing: Seeing one element is seeing the whole. Unity can be revealed with similar sizes, colors, surrounding blank spaces, logical organization exhibiting interrelation of IO in terms of the whole. With *fragmentation*, all IO seem to be isolated, to retain their own character themselves.

Repartition (Dumas, 1988; Horton, 1990) occurs when IO are shared mong the four quadrants of the layout as systematically as possible. *Quadrant preference*—the opposite of repartition —occurs when IO are preferably placed in one or many specific quadrants. Of course, we have taken into account the fact that human eyes favor the lefthand and lower area of any layout (this phenomenon is called *Preference for lower left*). But there are numerous examples of poorly distributed user interfaces. Most of these examples show displays in which IO are pushed over to the lefthand portion of the layout.

Is it because Western users read from left to right or because programmers find very easy this way of placing IO? In all cases, the repartition should be compatible with the task structure, rather than with the file or database structure.

Grouping (Dondis, 1973; Galitz, 1989; Horton, 1990; Tullis, 1981; Zahn, 1971) is a visual technique that creates a circumstance of give and take of relative interaction. Grouping is mainly based on the *law of attraction*: Two grouped IO fight for attention in their interaction by establishing individual statements depending on the distance between the IO. The closer the IO are, the stronger the attraction is. Grouping is also affected by the *law of similarity*: When dissimilar IO are grouped, the human eye increases the relation between them. When similar and dissimilar IO are grouped, hidden connections are identified quickly. Grouping is one of the best techniques for structuring a layout, namely by providing an aesthetic appearance, by helping remembering, and by accelerating a layout search. One of the most important usability guidelines is the fact that objects that are semantically linked should be grouped in some way (Vanderdonckt; 1994). Contrarily, objects that do not share any semantic relationship should be split. *Splitting*—the opposite of grouping—means that no such structure is visible: IO are displayed without the ability to visually perceive an attraction or a repulsion between IO.

Sparing (Dondis, 1973; Galitz, 1989; Horton, 1990) looks to avoid cluttered or overcrowded layouts: It suggests keeping the visual loading of a layout within reasonable boundaries. *Density*—the opposite of sparing—does not consider whether IO are stacked and packed too tightly in the layout. Generally, many layouts contain so much IO that easy scanning is impossible. The trend is to fill each layout space with as much IO as possible (e.g., text, fields, pushbuttons, images). The *visual loading*, sometimes called density, is, by definition, the proportion of busy positions on the layout. For alphanumeric displays, it can be expressed as the ratio of displayed characters by the total amount of characters in the layout (Tullis, 1983). In graphical user interfaces, the density is calculated by dividing the number of lighted pixels by the total number of available pixels. Streveler and Wasserman (1984) also measured the field density, which is the total number of fields (static or dynamic) in the layout, and the box density, which is the total number of visual groups whether surrounded or not. Tullis (1983) recommended that layout density should not exceed 25%. Horton (1990) suggested that the density of a welldesigned paper page be about 40%.

Ordering techniques

Consistency (Dondis, 1973) is a visual technique for expressing visual compatibility with the subject, for developing a layout whose IO are dominated by one sound, uniform, constant thematic. Consistency takes place not only in the dimensions or the ordering of IO, but also in their (little) differences. *Variation*—the opposite of consistency—is the strategy for identifying changes, elaborations as variations in musical themes. Variations do not necessarily take the form of unconsistency, where the same IO are laid out at different places from one layout to another. Moreover, variation can be assumed by a series, a continuum of IO whose contents, shapes, colors, and themes vary significantly.

Predictability (Dondis, 1973; Galitz, 1989) is a visual technique where IO are placed according to some order or plan that is highly conventional and recognizable. Knowing the information structure of the task, viewing one layout or remembering it should enable the user to predict how another layout will be arranged. Predictability also suggests the user is able to foretell in advance what the entire layout will be just by seeing a minimum part, or some significant part, of it. Predictability is enhanced through layout consistency. *Spontaneity*—the opposite of predictability—does not suggest such a highly conventional plan. The user will therefore be unable to infer successive layouts from already viewed layouts or to generalize the entire layout from its parts.

Sequentiality (Dondis, 1973; Galitz, 1989) is a layout plan that is arranged in a logical, rythmic, expected order. Many orders can be followed to sequentially place IO: numerical order, alphabetical order, chronological order, physical order, type order, sequential order, functional order, logical order, frequence order, importance order, consensus order, designation order, and so on. *Randomness*—the opposite of sequentiality—promotes the absence of a particular ordering plan, that is, a layout where the IO flow cannot be detected due to the lack of plan, or a disorganized, accidental, random one.

Continuity (Dondis, 1973) keeps the visual connections between the IO. These connections are fundamental for preserving a unitized visual statement. Continuity can be achieved by uninterrupted steps from one IO to another. This is often the case in video sequences, series of snapshots, morphing pictures, and so forth. Continuity means the cohesion of the parts to the whole layout. *Episodicity*—the opposite of continuity—interrupts the visual connections that may exist between the IO. Episodicity means the reinforcement of the parts of a layout without adding new meaning or message with all IO taken as a whole.

Photographic techniques

Sharpness (Dondis, 1973) is a visual technique that is closely related to clarity of both physical state and expression. Having sharpness in a layout can be interpreted as having:

- Clearly distinctive IO (e.g., information to be input should be distinctive of information to be displayed by the system).
- IO with precise outlines, hard edges, distinct margins.

The effect of sharpness is a distinct atmosphere. *Diffusion*—the opposite of sharpness—opts for less precision of character, more fuzzy, more feeling and warmth.

Roundness (Dumas, 1988; Horton, 1990) is the preference for curved IO. *Angularity*—the opposite of roundness—is the preference for IO with angular, rugged outlines.

Stability (Dondis, 1973) is the expression of preference for IO that have clear foundation. *Stress*—the opposite of stability—occurs when IO are not placed on their firm base or stability: A circle is a good example. Placing a rectangle or a triangle on one of its corners causes stress. When an IO is intrinsically irregular, the analysis and establishment of balance is more involved and intricate.

Leveling is a visual technique for automatically establishing balance through artifacts. IO are laid out so that balance axis will stand out. Through perception, balance can be emphasized (or rubbed out, repectively) when we recognize easily (with difficulty, respectively) the abstract visual condition of balance. This is often the case when IO are equally distributed in two colums with two alignment points per column. *Sharpening*—the opposite of leveling—on the other hand, destroys any automatic balance by placing IO on unexpected, unbalanced locations.

Activeness (Dondis, 1973) reflects motion through explicit representation or implicit suggestion. The goal of activeness is to design an active and energetic layout with lively postures (e.g., arrows, stopped image in a video sequence, an action snapshot). *Passiveness*—the opposite of activeness—withdraws any IO that could bring a dynamic effect. Passiveness relies on the technique of static representation, which presents an atmosphere of quiescence, resting by equilibrating IO.

Subtlety (Dondis, 1973) is a visual technique used in order to make a fine distinction, shunning any obviousness and energy of purpose. Subtlety is often synonymous with ingeniosity since it requires delicate, highly refined IO. *Boldness*—the opposite of subtlety—looks for every obvious IO in its context. Boldness is often synonymous with optimum visibility of all IO in the layout.

Representation (Dondis, 1973) subsumes subtletly because its intended purpose is to use IO that concretely represent the real world in details. *Abstraction*—the opposite of representation—uses IO that abstract the real world in many ways. Icons, for example, can be representative if they simply translate a physical object or they can be abstract if they mimic some action or just represent metaphors or major characteristics of the physical objects. For instance, concrete icons are believed to be better than abstract icons.

Realism (Dondis, 1973) is the natural technique of camera. Many tricks and conventions are able to replicate the same visual cues that our eyes convey to our brain when receiving an external image. Realism tries to follow the camera in the same way by reproducing exactly what we see (e.g., "what you see is what you lay out"?). Perspective (Staples, 1993) is one possible technique for providing realism in 3D contexts. *Distortion*—the opposite of realism—tampers with realism, seeking control of effect through the deformation of the real IO in shape, form, or color. This technique covers zooming in and out, magnifying lens, fisheye views (Furnas, 1986; Leung & Apperley, 1993), pictures cut in moved rows, torn pictures. Distortion is an eyecatching way to produce an intense response.

Flatness (Dondis, 1973) does not use any technique for providing perspective, so erasing the natural feeling of dimension and space. *Depth*—the opposite of flatness—tries to render perspective by replicating the environment through effects of light, shade, gradient of color, overlapping (Seligman & Feiner, 1991).

Examples of visual techniques

Physical and ordering techniques are typically the visual techniques that the designer may apply for the layout of traditional applications, since these techniques are effective for alphanumeric displays and for graphical user interfaces. This is not the case with real multimedia applications. Real multimedia applications are not those database applications where one or two fields containing images or video have just been added (in this case, rectangular layout grids are still useful). Figure 7.2 depicts a simple multimedia application with its related grid. Real multimedia applications are those applications where the screen consists of a real mix of images, pictures, video, text, graphics controls, icons, and so on, with a high degree of interaction, not just leaving the user to gaze passively.

Figure 7.3 illustrates the three first sets of visual techniques (i.e., physical, composition, association and dissociation techniques). Symmetry is not preserved, but balance is partially established with the two columns whose length are equal, but whose heights differ significantly. The plan used for regularity promotes the localization of the picture on the upper left part of the layout, because this information is the center of all interactions and informations displayed elsewhere. Alignment is extremely well achieved because of the two columns reducing the number of alignment points. Even if these columns highlight more verticality than horizontality, they are sized with appropriate proportions: The area containing the picture has a good aspect ratio (Feiner, 1988), the textual zones are limited in height and separated.

The background color of this layout is mainly black, whereas textual information is displayed with white and green as foreground color. The x-ray picture is in grayscale. Therefore, positivity with a very high degree (this may obscure the reading) is reached rather than negativity, but the accent is placed on the picture because it is lighter. Repartition is guaranteed by filling the two columns of the layout, with pushbuttons on the bottom. Grouping is also seen via the progressive disclosure of objects: The title and the picture are first displayed, textual information follow group by group, with different definitions highlighted in each group, commands end the reading path of the layout in each column.

The order of objects in each column is highly predictable and sequential, following a natural and logical order of reading and understanding. Locating the text objects first should force the reader to first look at the picture on the right before understanding the contents of the information.

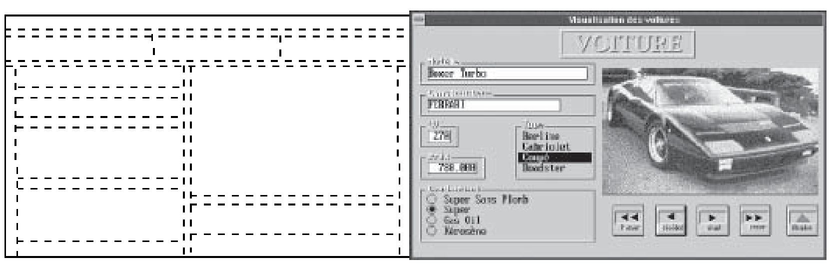

Figure 7.2. A simple multimedia layout and its related grid.

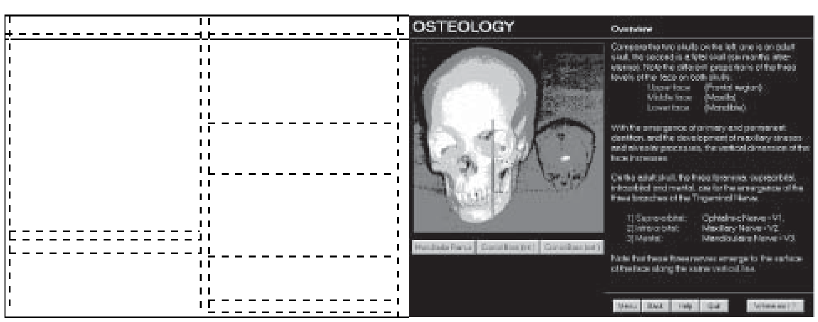

Figure 7.3. A multimedia layout in osteology and its related grid.

Photographic visual techniques are relevant to the picture: sharpness, angularity; stability, leveling, passiveness, boldness, representation, realism and flatness give a 6/9 score in favor of harmony and a 3/9 score in favor of contrast.

Despite these qualities, this screen still relies on a layout grid only consisting of vertical and horizontal lines. Although they are not numerous and very simple, they do not suggest a very sophisticated interaction between the system and the user. All physical visual techniques (e.g., symmetry, balance) are respected in the case of figure 7.4. This is a good example of achieving vertical symmetry (in the centre of the second column) and balance independently of the contents of the pictures. Other characteristics of figure 7.4, although very similar to figure 7.3, are very economic, neutral, and, moreover, continuous. The rectangular pictures are equally shaped, following the western convention of reading from the left to the right, and from the top to the bottom. Each picture represents a particular state in the life of the bones. A visual continuity is then established between the images, which is further reinforced by full juxtaposition.

Obvious outline gives sharpness in the space of the work environment of a user (figure 7.5). Stability is apparent in this layout since the main window and the wires of the space are horizontal and vertical. A slight sharpening is provoked by moving the window on the left rather than on the center, but this provides more the feeling of space. Activeness is raised by the impression of movement toward the vanishing point. Subtlety, distortion, and depth are all produced by the illusion of space and perspective. The wired representation of perspective is more abstract than a real space representation, but this representation becomes more obvious to the eyes.

Figure 7.6 highlights that a sequence of screen can take advantage of reusability of the underlying grid. Indeed, the same top area with the aircraft and the takeoff/landing strip is repeated on each layout and

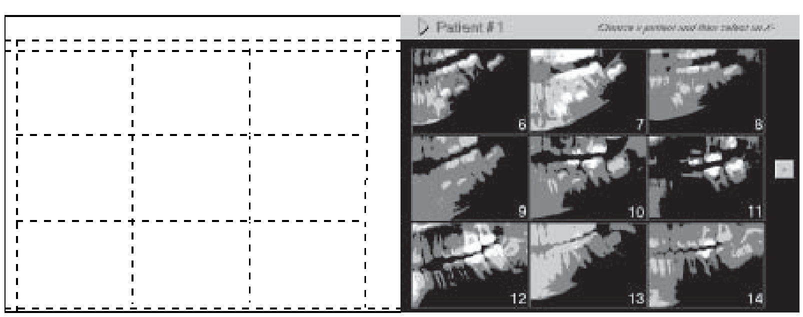

Figure 7.4. A continuous multimedia layout and its related grid.

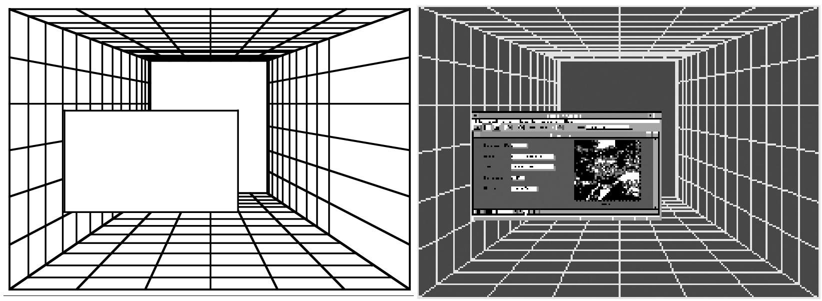

Figure 7.5. A layout of a work environment and its related frame.

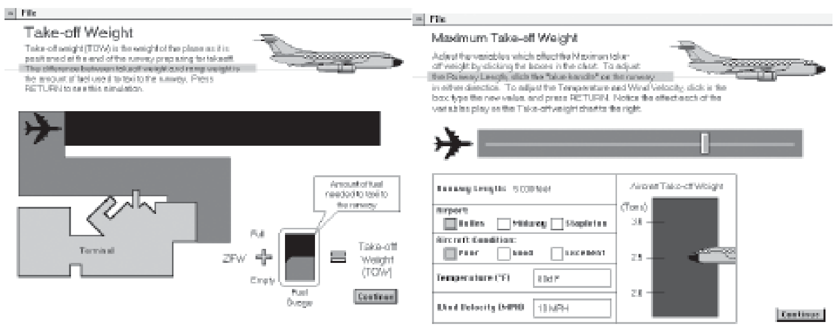

Figure 7.6. Reusability of a layout frame.

different bottom areas are presented according to the nature of information. These two screens prove that consistency may be partially applied, though the rest of the layouts prefer variation. This apparent lack of consistency does not necessarily reduce other ordering techniques from the time the user remarked the different portions.

Layout guidelines based on visual techniques

The experience gained by applying these techniques suggests some guidelines, as already done in HyperCard (Apple, 1992):

- Apply physical visual techniques for traditional layouts, especially when the layout is text-dominant rather than graphic-dominant; balance is the most important visual technique to achieve;

- Apply composition visual techniques with contrast so that visibility is not endangered;
- Apply association and dissociation visual techniques with contrast carefully: Fragmentation and quadrant preference may hold in certain cases, but splitting and density are to be avoided in every case;
- Apply ordering visual techniques with contrast where the user's task is intrinsically unstructured or asynchroneous, and with harmony where the user's task is structured or sequential;
- Apply exaggeration, accent, singularity to draw a visual impact on the most important objects of the frame if no ordering visual techniques can be applied;
- Apply photographic visual techniques for pure multimedia elements only;
- Prefer abstraction rather than representation in each frame where the real world should not necessarily be depicted as is: Abstract images or raster pictures are more easily understood than complex digitized images;
- Combine visual techniques with contrast only when appropriate; the combination of techniques increases the visual impact of the frame, but uncareful combination may destroy the intended purpose.

Conclusion

By summing up techniques used in each category, it is possible to rank screens by comparison. Visual techniques per se do not mean that a screen oriented toward harmony is better than a screen oriented toward contrast or vice versa. Rather, it helps designers to more precisely estimate the impact of such a screen, depending on the target audience. If a "traditional" audience is expected, perhaps with efficiency goals in mind, it is likely that visual techniques in the domain of harmony will be preferred. Instead, if a "nontraditional" audience is targeted, visual techniques in the domain of contrast may catch more attention than the traditional ones. Furthermore, they may also increase the visual cognitive load. This decision is a tradeoff between usability and desired visual impact.

Although our body of knowledge about multimedia objects is still insufficient today, several points can be highlighted:

- Multimedia objects can be qualified with certain attributes (Faraday & Sutcliffe, 1993; Sutcliffe & Faraday, 1994).
- Reasonable proportions for displaying images and video sequences are already known (Feiner, 1991).

- Visualization techniques for special objects (3D objects, maps) are well studied (Furnas, 1986).
- The layout frame should be governed by these attributes and informations.

In addition, it is conceivable that the aforementioned visual techniques could be included as part of a tool to help designers generate better multimedia layouts.

Additional study of such visual techniques in the realm of multimedia objects can only improve designs. All multimedia objects exhibit these techniques; the only real question is whether they are the ones the designer intended.

Note

For additional material related to this chapter, please see http://www.isys.ucl.ac.be/bchi/members/jva/pub/visual.htm.

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