

Information Design

YAH and Dynamic Displays

DEA3250/6510

Wayfinding Signs

- ◆ Wayfinding is an important task in buildings (e.g. airports, hospitals, hotels, stores etc.).
- ◆ Wayfinding signs often present the user with You-Are-Here (YAH) information to orient the user to the building.
- ◆ YAH signs often are poorly designed and poorly placed in environments.

Poor YAH Design in an Airport

Airport YAH Sign: Where am I? YAH Signs

- ◆ Somebody designed this for the International Design Center in NY city!

YAH + Text Displays

Annunciator Displays

- ◆ Status Lights/ Annunciator Displays dynamically indicate the state of a system, but do not indicate any quantity.

Examples: Annunciator Lights

- ◆ Vehicle warning lights.
- ◆ Power on lights.

Center-Mounted Brake Lights

- ◆ High CMBL - drivers show 60msec faster RT (~6 feet @ 65 mph).
- ◆ >50% decrease in accident rate (from 3 studies).
- ◆ 38% decrease in damage costs per accident.
- ◆ Total savings ~ \$1.5 billion.

Dynamic Displays

- ◆ Dynamic displays can be:
 - Analog
 - Digital
 - Qualitative
 - Quantitative

Uses of Dynamic Information

- ◆ Quantitative readings - obtain a precise quantity, rate of change.
- ◆ Qualitative readings - obtain an approximate quantity, direction of change.
- ◆ Check readings - check whether parameters are within normal bounds or several are equivalent.
- ◆ Situation awareness - obtain space/time information.

Qualitative Displays

- ◆ Color coding used to denote "safe" and "unsafe" conditions.

Qualitative/Quantitative Displays

- ◆ Color zones can be used to indicate desired conditions.
- ◆ Poor display because of scales.

Color Zone

- ◆ Color zones can be used to indicate unsafe conditions.
- ◆ Poor display because of scales.

Quantitative Displays

- ◆ Fixed scale - moving pointer (e.g. speedometer).
- ◆ Fixed pointer -moving scale (e.g. analog bathroom scales).
- ◆ Digital display - (e.g. digital watch)

Display Design

- ◆ Analog displays - round, horizontal or vertical displays where the quantity is indicated by a pointer and the value by the background.
- ◆ Digital displays - numeric displays of an actual quantity or the variable of interest.

Digital vs. Analog Displays

- ◆ Analog Displays - Preferred when direction of change is important, rate of change is important, or anticipatory information is important.
- ◆ Digital Displays - Preferred when precise numeric values are required, legible digits are needed quickly or the value remains stable for a long enough period to be read.

Analog Display Design

- ◆ Moving pointer on a fixed scale is preferred.
- ◆ If numerical change relates to natural function (e.g. up/down) then vertical display is preferred to circular display.
- ◆ Types of pointer-scales should not be mixed to indicate related functions in displays.
- ◆ Direction of movement of pointer should match that of the control.
- ◆ If value must be read quickly then a moving scale appearing in an open-window is best.

Analog Display Design

- ◆ Semi-circular or circular displays preferable to horizontal or vertical displays.
- ◆ Adjacent scales should have similar markings and be oriented to the same point to indicate normal operation. This is exemplified with check scales.
- ◆ Use dials with target zones where possible because these are faster and easier to read. Mark zones with labels and colors. For aircraft define where they should be. For autos define where they shouldn't be.

Analog Displays: Numerical Progression

- ◆ intervals of 1 are easiest to read (0, 1, 2, ...).
- ◆ decimal progression is the second most preferred (10, 20, 30,...).
- ◆ units of 5 is the next best (5, 10, 15, ...) intervals of 2 are also OK (2, 4, 6, ...).
- ◆ avoid unusual progressions (e.g. by 3, by 7, by 8).
- ◆ scale intervals should represent consistent progressions (all intervals should equal the same amount).

Analog Displays: Scale Markings

- ◆ Marker length depends on level of illumination - markers must be thicker and farther apart in low light.
- ◆ markings should be presented for the smallest scale unit that needs to be read.
- ◆ use different interval markers (in gradations like a ruler).
- ◆ zero should be placed at 6 o'clock or 12 o'clock (standard for auto industry is 7 o'clock however).

Analog Displays: Scale Type

- ◆ type should be upright and from left to right not slanted at an angle or radially.
- ◆ use simple fonts (sans serif) and legible printing.

Analog Displays: Scale Markers and Interpolation

- ◆ use a linear scale.
- ◆ interpolations should be in decimal scales - 5's or 10's.
- ◆ interpolation is fastest when pointer is on a marker.

Analog Displays: Pointer design

- ◆ use a tip angle of 20% pointer width.
- ◆ tip should touch smallest scale markings but not obscure them.
- ◆ to avoid parallax, pointer should be as close to the scale surface as possible (may have to raise scale markings).
- ◆ clockwise motion is preferred to indicate increase.

Analog Displays: Illumination

- ◆ maximize contrast (scale vs. background)
- ◆ in low illumination use white pointer and markings on a dark background.
- ◆ use dark pointer and markings on a white background for high illumination.

Analog Displays: Scale Size and Viewing Distance

- ◆ To find necessary size of dimension multiply dimension standard (at 28" = normal viewing distance) by its viewing distance (X) in inches and divide by 28, i.e.
Dimension at viewing distance (X) = Dimension at 28" (d28) x (X/28). (where all dimensions are in inches).
For example, if X = 56" and d28=1"
 $dX = (d28) \times (X/28)$
 $dX = 1 \times (56/28) = 1 \times 2 = 2$ i.e. double the size

Analog Displays

- ◆ Analog displays are often used in cars.

Automobile Displays

- ◆ Ergonomics impacts control/display design.

Colored-digital displays

- ◆ Colored digital displays are replacing some analog designs in cars.

Analog-Digital Display

- ◆ Analog and digital elements can be mixed in a single display instrument (e.g. altimeter).

Electronic Quantitative Displays

- ◆ With non-numeric bar-type displays these are best read when only one segment is indicated.
- ◆ Although with a variable such as rpm, a complete bar-type display that grows longer or shorter may be more relevant.

Check Displays: Console Layout

- ◆ In check reading the 'normal' position should be either at 9 or 12 o'clock.
- ◆ all pointers should be aligned similarly.
- ◆ Lines between the dials can increase the strength of the 'gestalt' for the display.

Cockpit Displays

- ◆ Display consoles often present a mixture of display types.

Representational Display

- ◆ These displays show a representation of reality.
- ◆ Such displays include maps, airplane radar, computer interface, etc.

767 displays

- ◆ Electronic analog displays are still used in many settings, such as aircraft consoles.

Electronic Mixed Displays

- ◆ Many display types can be mixed with electronic display consoles.

Example: Poor design

- ◆ Fork lift truck with minimal annunciator lights and a qualitative display.

Example: Ergonomic Design

- ◆ Full range of information displayed in appropriate designs.
- ◆ With variables such as speed, where rate is important, a complete bar-type display that grows longer or shorter is good.

Example: Display Generalizability

- ◆ Display elements that can be used on related products can facilitate performance.

Example: Poor Design

- ◆ Scale - what scale?

Example: Poor Design

- ◆ Scale - a log scale?

Example: Poor Design

- ◆ Small zone - big scale!