Fundamental principles of interaction

Life is made of experiences

Great designers produce pleasurable **experiences**. Engineers tend not to like it; it is too subjective. But…

“when I ask them about their favorite automobile or test equipment, they will smile delightedly as they discuss the fit and finish, the sensation of power during acceleration, their ease of control while shifting or steering, or the wonderful feel of the knobs and switches on the instrument.” **Those are experiences! (D. Norman)**

Experience is critical, for it determines **how fondly people remember their interactions**. Was the overall experience positive, or was it frustrating and confusing?

Donald Norman video course playlist
https://www.youtube.com/playlist?list=PLAwxTw4SYaPlr4Uq3RoYuwlDADp0WQdGI

Cognition and emotion

When our home technology behaves in an uninterpretable fashion we can become confused, frustrated, and even angry—**all strong negative emotions.**

When there is understanding it can lead to a feeling of control, of mastery, and of satisfaction or even pride — **all strong positive emotions.**

Cognition and emotion are tightly intertwined, which means that the designers must design with both in mind.

https://www.youtube.com/watch?v=LTE-v4RzRHs&list=PLJOFJ3Ok_idv_6hQGNt23xVXuQwKFmfxG&index=8&ab_channel=NNgroup

Discoverability

When we interact with a product, **we need to figure out how to work it.** This means **discovering** what it does, how it works, and what operations are possible.

Discoverability results from appropriate application of 6 **fundamental psychological principles:**

- **affordances**
- **signifiers**
- **constraints**
- **mappings**
- **feedback**
- **conceptual model of the system**

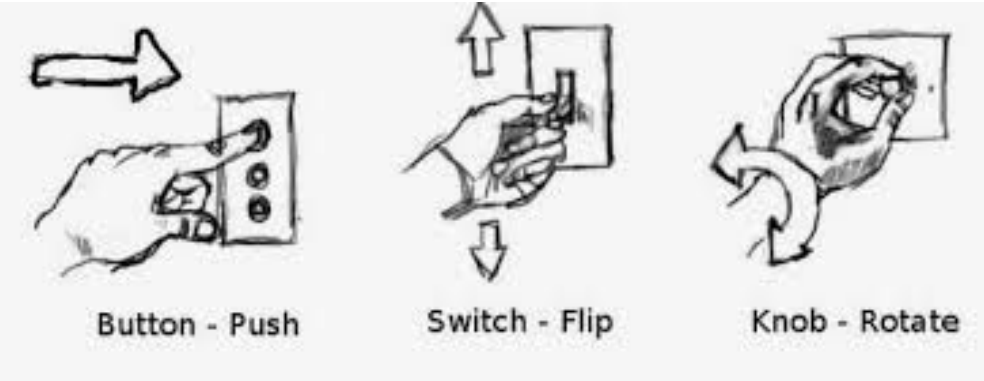
AFFORDANCES

Affordances

The term **affordance** refers to **the relationship** between a physical object and a person.

An affordance is a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used.

A chair affords (“is for”) support and, therefore, affords sitting.



Affordances are relationships

We are used to thinking that properties are associated with objects.

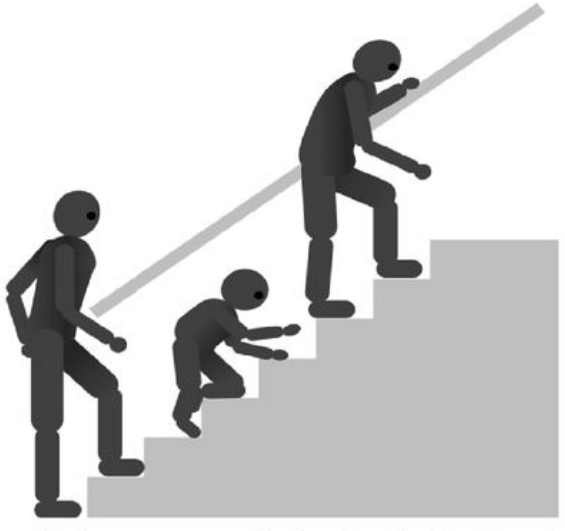
But **affordance is not a property.**

An **affordance is a relationship.**

Whether an affordance exists depends upon the properties of both the object and the agent.

Affordances are relationships

Most chairs can also be carried by a single person (they afford lifting), but some can only be lifted by a strong person.
If young or relatively weak people cannot lift a chair, then for these people, the chair does not have that affordance, it does not afford lifting.



https://www.youtube.com/watch?v=NK1Zb_5VxuM&ab_channel=Interaction-Design.org

Anti-affordance

anti-affordance -> the prevention of interaction.

Affordances

To be effective, affordances and anti-affordances have to be: **discoverable and perceivable**.

This poses a difficulty with glass. The reason we like glass is its relative invisibility, but this aspect, so useful in the normal window, also hides its anti-affordance property of blocking passage.

As a result, birds often try to fly through windows.

SIGNIFIERS

Signifiers

Designers have practical problems.

They need to know how to design things to make them understandable.

They soon discovered that when working with the graphical designs for electronic displays, they needed a way to designate which parts could be touched, slided upward, downward, or sideways, or tapped upon.

Signifiers

How could designers describe what they were doing?

There was no word that fit, so they took the closest existing word: **affordance**.

“I put an affordance there” to describe why they displayed a circle on a screen to indicate where the person should touch, whether by mouse or by finger.

NO -> that is not an affordance! That is a way of communicating where the touch should be.

You are communicating **where** to do the touching!

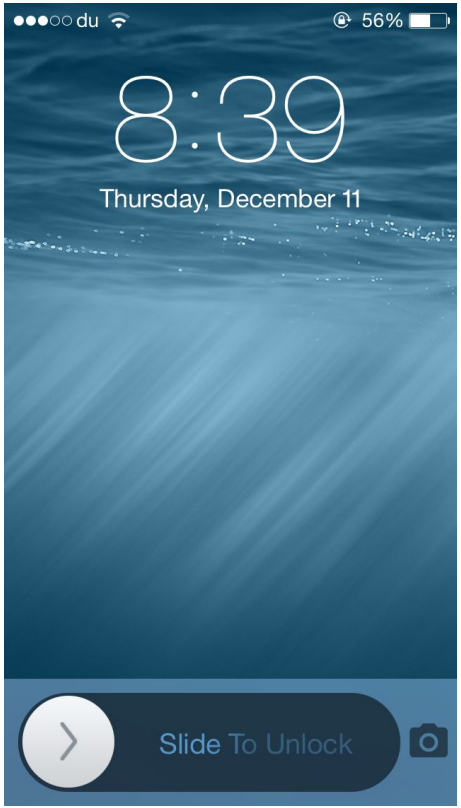
Signifiers

The affordance of touching exists on the entire screen:

That's not the same thing as saying **what** action is possible.

Affordances determine **what** actions are possible.

Signifiers communicate **where** the action should take place.



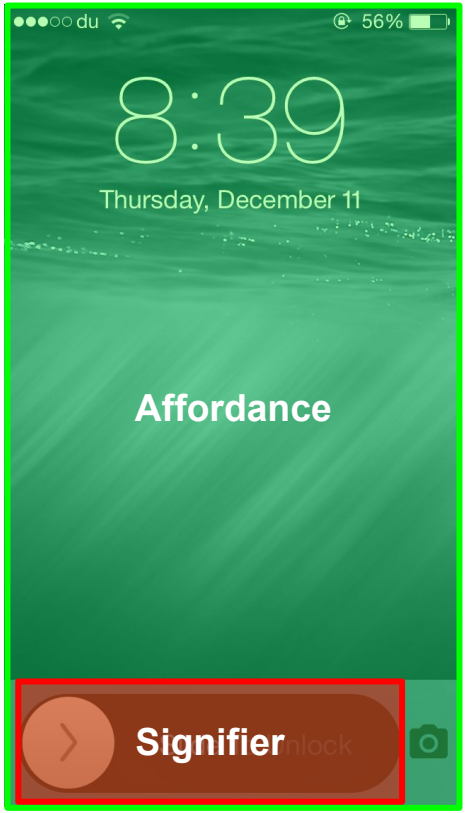
Signifiers

The affordance of touching exists on the entire screen:

That's not the same thing as saying **what** action is possible.

Affordances determine **what** actions are possible.

Signifiers communicate **where** the action should take place.



Signifiers

Signifiers can be **deliberate** and **intentional**, such as the sign push on a door

they may also be **accidental** and **unintentional**, such as our use of the visible trail made by previous people walking through a field or over a snow-covered terrain to determine the best path.

Figure 2. Crowds as social signifier. Did the train already leave? The state of the train platform provides the answer. Here, the presence or absence of waiting passengers serves as a social signifier, signifying a train that has

Signifiers

Affordances represent the possibilities in the world for how an agent can interact with something. Some affordances are perceivable, others are invisible.

Signifiers are signals. Some signifiers are signs, labels, and drawings placed in the world

Some signifiers are simply the perceived affordances, such as the handle of a door

Note that some perceived affordances may not be real

Signifiers

In design, signifiers are more important than affordances, for they communicate how to use the design

Perceiving affordances and signifiers

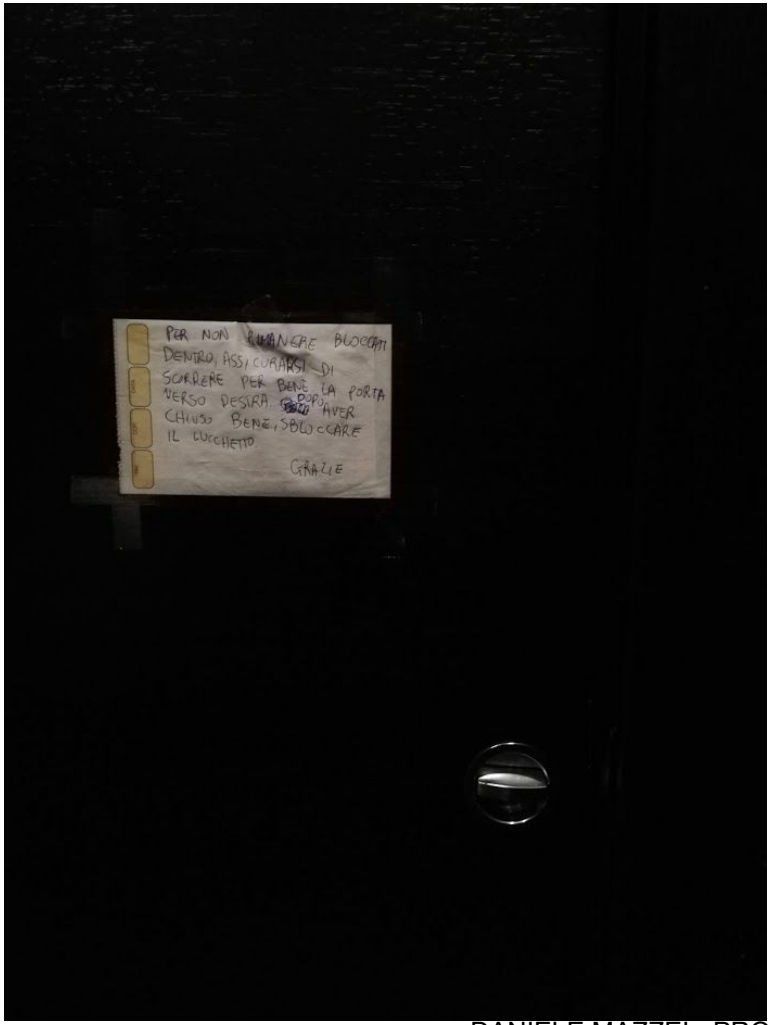
But how does one go from the perception of an affordance to understanding the potential action?

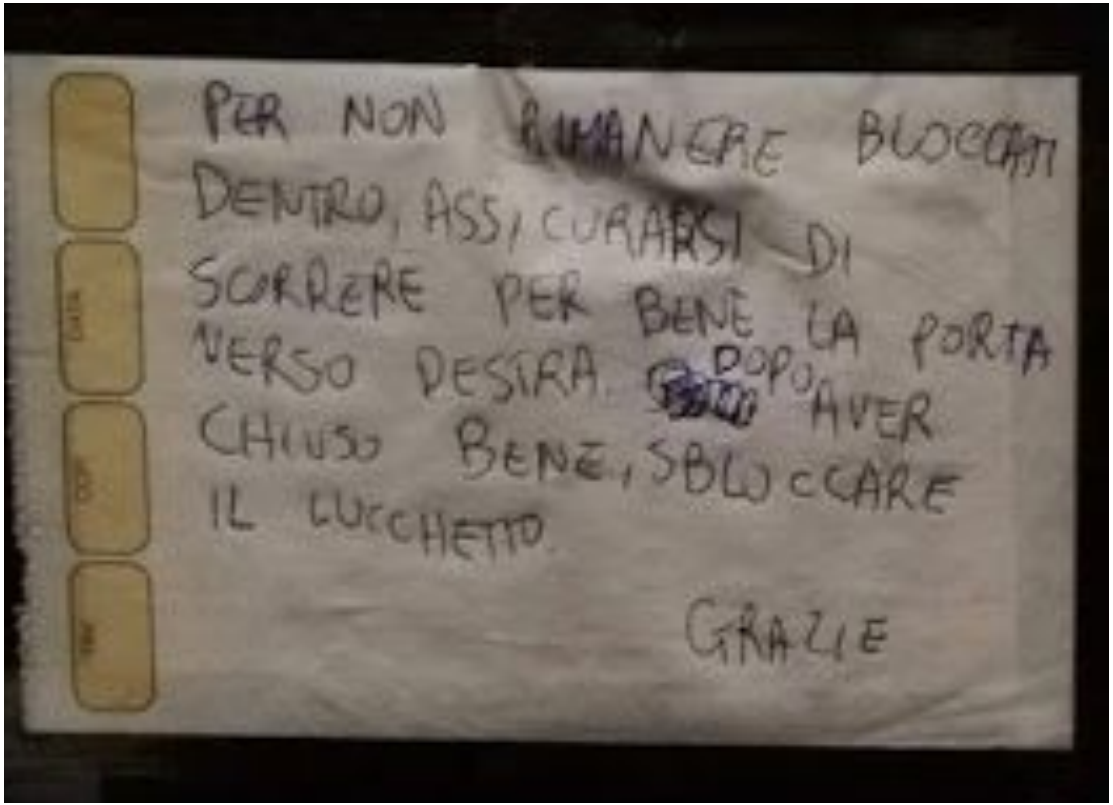
In many cases, through conventions.

A doorknob has the perceived affordance of graspability. But knowing that it is the doorknob that is used to open and close doors is learned: it is a cultural aspect of the design that knobs, handles, and bars, when placed on doors, are intended to enable the opening and shutting of those doors. The same devices on fixed walls would have a different interpretation: they might offer support, for example, but certainly not the possibility of opening the wall.

The interpretation of a perceived affordance is a cultural convention.

https://www.youtube.com/watch?v=UtulTXJLGOI&ab_channel=LeahGreis





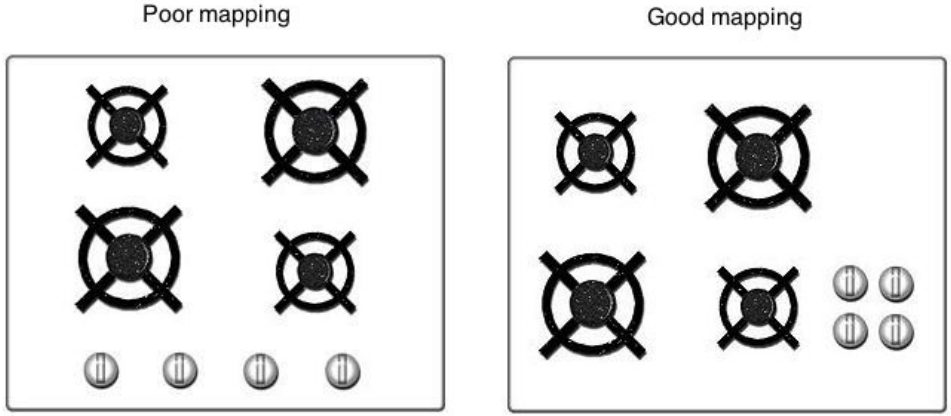
MAPPING

Mapping

Mapping means the relationship between the elements of two sets of things.

Mapping is an important concept in the design and layout of controls and displays. When the mapping uses spatial correspondence between the layout of the controls and the devices being controlled, it is easy to determine how to use them.

Natural mapping (taking advantage of spatial analogies) leads to immediate understanding.



Mapping

Some natural mappings are cultural or biological, as in the universal standard that moving the hand up signifies more, moving it down signifies less, which is why it is appropriate to use vertical position to represent intensity or amount.

Note that there are many mappings that feel “natural” but in fact are specific to a particular culture.

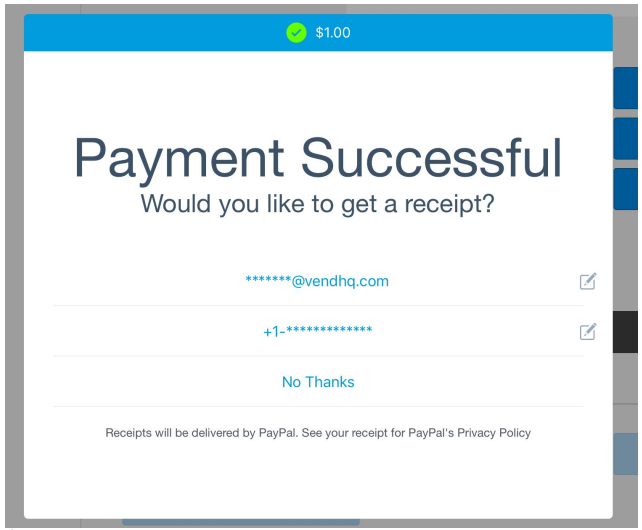
FEEDBACK

Feedback

Ever watch people at an elevator repeatedly push the Up button, or repeatedly push the pedestrian button at a street crossing?

<u>What is missing in these cases is feedback:</u> some way of letting you know that the system is working on your request.

Feedback: communicating the results of an action



Feedback

Feedback must be immediate

even a delay of a tenth of a second can be disconcerting. If the delay is too long, people often give up, going off to do other activities.

Feedback must also be informative.

Poor feedback can be worse than no feedback at all, because it is distracting, uninformative, and in many cases irritating and anxiety-provoking.

“My dishwasher likes to beep at three a.m. to tell me that the wash is done, defeating my goal of having it work in the middle of the night so as not to disturb anyone”

Feedback

Too many announcements cause people to ignore all of them, or wherever possible, disable all of them, which means that critical and important ones are apt to be missed.

Feedback is essential, but not when it gets in the way of other things, including a calm and relaxing environment.

Notifications become useless!

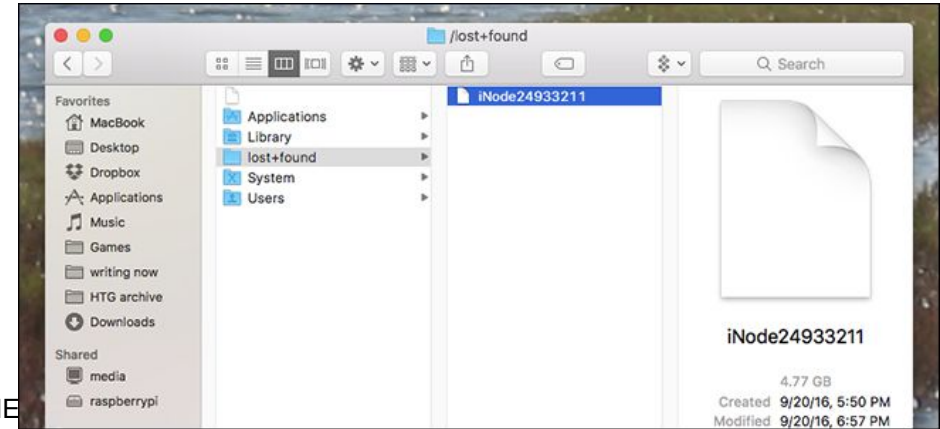
CONCEPTUAL MODEL

Conceptual Model

A conceptual model is an explanation, usually highly simplified, of how something works. It doesn't have to be complete or even accurate as long as it is useful.

The files, folders, and icons you see displayed on a computer screen help people create the conceptual model of documents and folders inside the computer, or of apps or applications residing on the screen, waiting to be summoned.

In fact, there are no folders inside the computer, those are effective conceptualizations designed to make them easier to use.



Conceptual Model

Simplified models are valuable only as long as the assumptions that support them hold true.

Cloud Storage Sync: files appear to be on the device. But in fact, in many cases the actual material is “in the cloud”.

The conceptual model is of one coherent storage available on all the user’s devices.

This simplified model is helpful for normal usage, but if the network connection to the cloud services is interrupted, the result can be confusing.

Files are still shown on users device screen, but users can no longer open save it

Mental Model

Mental models, are the conceptual models in people's minds that represent their understanding of how things work.

Different people may hold different mental models of the same item.

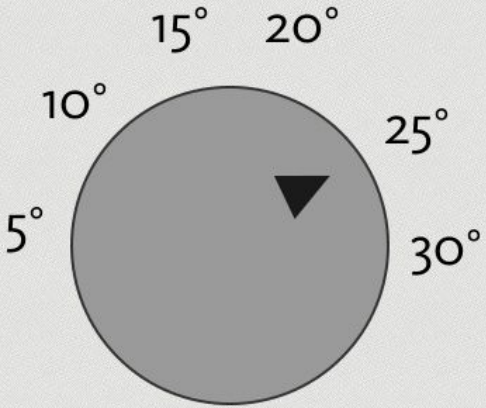
Indeed, a single person might have multiple models of the same item, each dealing with a different aspect of its operation: the models can even be in conflict.

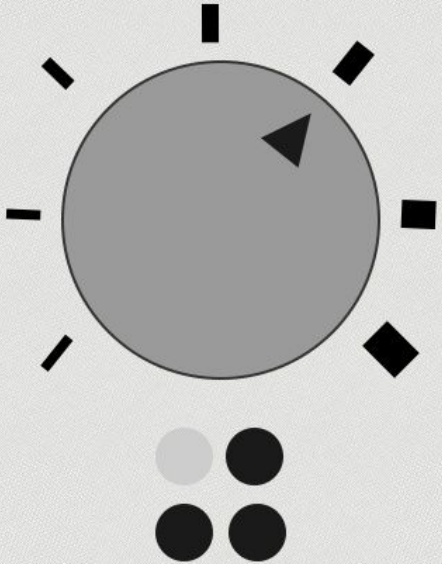
Conceptual Model

Conceptual models are often inferred from the device itself.

Some models are passed on from person to person. Some come from manuals.

Usually the device itself offers very little assistance, so the model is constructed by experience. Quite often these models are erroneous, and therefore lead to difficulties in using the device.





This is the thermostat in my house. My old flatmate used to come home feeling cold and turn up the heat to 25 degrees so the house would heat up quicker. Flawed thinking. That's not how a thermostat works.

Compare that to a the heating element on a gas hob. It does work that way. Not flawed thinking but a flawed mental model.

MENTAL MODEL

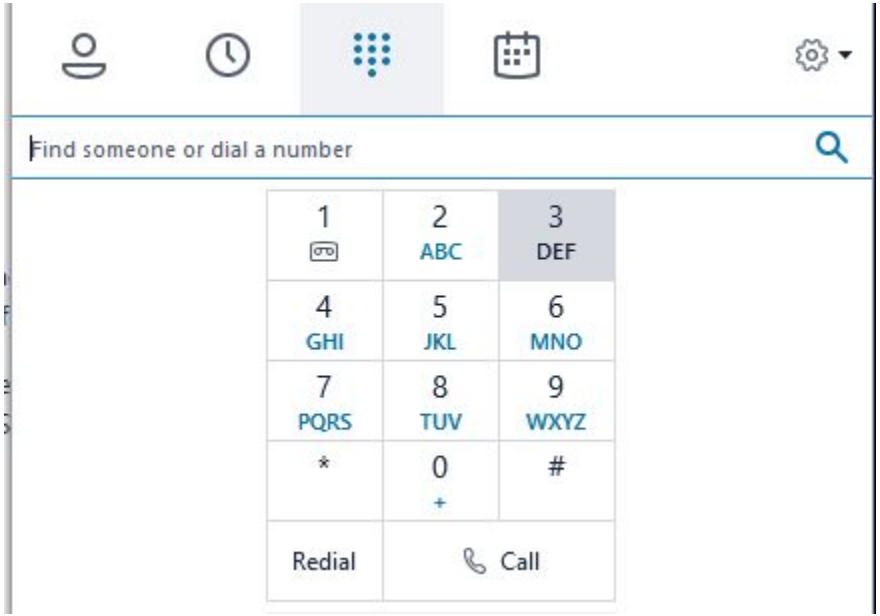
cxpartners

@mrjoe

https://www.slideshare.net/cxpartners/psychology-for-designers-or-3-predictions-from-psychology-for-the-future-of-web-design-by-mrjoe/27-mrjoe51015_2025mental_model30This_is_the

Conceptual Model

Conceptual Model



SYSTEM IMAGE

System Image

People create mental models of themselves, others, the environment, and the things with which they interact.

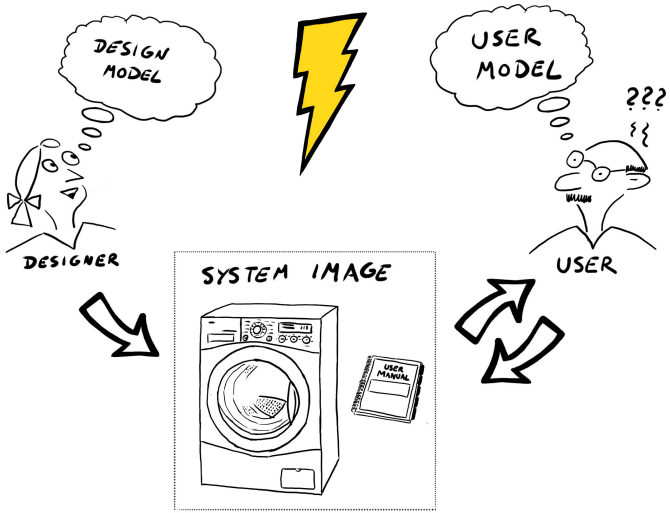
These are conceptual models formed through experience, training, and instruction.

These models serve as guides to help achieve our goals and in understanding the world.

System Image

How do we form an appropriate conceptual model for the devices we interact with?

We cannot talk to the designer, so **we rely upon whatever information is available** to us: what the device looks like, what we know from using similar things in the past, what was told to us in the sales literature, by salespeople and advertisements, by articles we may have read, by the product website and instruction manuals.



Combined information available to us is the **system image**.

System Image

When the system image is incoherent or inappropriate, then the user cannot easily use the device. If it is incomplete or contradictory, there will be trouble.

The designer's conceptual model is the designer's conception of the product, occupying one vertex of the triangle. After sale the product itself is no longer with the designer, so it is isolated as a second vertex, perhaps on the user's kitchen or wall.

The system image is what can be perceived from the physical structure that has been built

https://www.youtube.com/watch?v=shSCUNxtn18&ab_channel=LeahGreis

Example: System image of a smart Thermostat

Vimar Wifi
https://www.vimar.com/it/it/cronotermostato-touch-screen-wi-fi-da-parete-02911-video-guida-a-11721152.html

NEST https://www.youtube.com/watch?v=dHKD-9uI24I

:) https://www.youtube.com/watch?v=5yJOyKr4GBA

Changing Conventions

People invariably object and complain whenever a new approach is introduced into an existing array of products and systems.

Conventions are violated -> new learning is required.

The merits of the new system are irrelevant: it is the change that is upsetting.

Consistency in design is virtuous.

If a new way of doing things is only slightly better than the old, it is better to be consistent. But if there is to be a change, everybody has to change.

NB: Mixed systems are confusing to everyone!

Rethinking OS

https://uxdesign.cc/introducing-mercury-os-f4de45a04289

