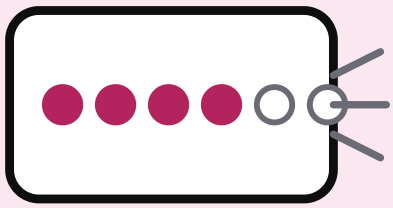
Concept

Cognitive load

The mental effort a task demands from working memory, which can only handle a few things at once.



In Spanish
Carga cognitiva

Origin
Sweller (1988), building on Miller (1956)

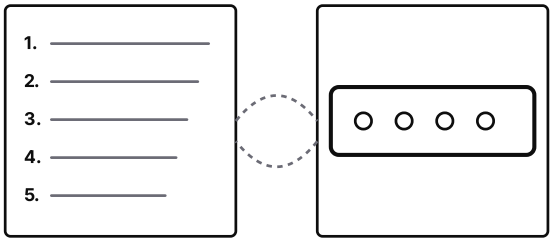
What problem it addresses

It explains why we make mistakes or give up when an interface makes us remember, search for or compare too many things at once.

An example

The instructions for setting up a router.

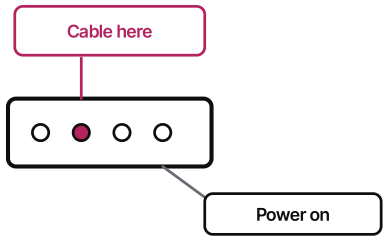
Text separate from the drawing



You have to flip back and forth between pages

The steps on one page and the drawing of the device on another. You have to flip back and forth. **You have to remember while you search.**

Text next to each part



Each instruction next to its part

Each instruction beside the part it refers to. **You look and you do.**

The information is the same. What changes is how much you have to hold in mind meanwhile.

Why it happens

1 

Working memory holds few things at once.

2 

Everything you have to remember or look for takes up part of that space.

3 

If it fills up, we make mistakes or give up.

Applications in design

✓ Use it like this

Show information where it is needed, without making people remember it from one screen to another.

✗ Avoid

Asking people to copy a code from one screen to type it into another.

Don't fall for it

Removing too much also has a cost: if information is missing, people have to go looking for it.

7 ± 2 items

What the research says

Miller (1956) proposed it as the approximate limit of what we can hold at once.

●●● **Solid evidence.** Sweller (1988) showed that solving a problem can take up so much memory that less is learned. The theory was born in education; it applies to interfaces by extension. Later studies put the limit at around 4 items (Cowan, 2001).

Connections

Used in

- Conversational design
- Information design
- Voice UX
- Learning design
- UX design
- UI motion design
- Data visualization

Related to

- Progressive disclosure
- Flow
- Hick's law
- Miller's law
- Tesler's law
- Mental model
- Accuracy of visual encodings
- Gestalt principles of perceptual organization
- System 1 and System 2
- Choice overload
- Contract visualization

Authors and works

1956	**George A. Miller**	Showed the limits of how much information we can hold at once.
1988	**John Sweller**	Proposed that the effort of solving a problem competes with the effort of learning.

Sources

Original sources

- Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. Psychological Review, 63(2), 81–97. View source (https://doi.org/10.1037/h0043158)
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. Cognitive Science, 12(2), 257–285. View source (https://doi.org/10.1207/s15516709cog1202_4)

Academic reviews

- Cowan, N. (2001). The magical number 4 in short-term memory: A reconsideration of mental storage capacity. Behavioral and Brain Sciences, 24(1), 87–114. View source (https://doi.org/10.1017/S0140525X01003922)

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