

# Where are my keys?

July 19, 2017

I've lost my keys. I last used them yesterday, when I drove back from work. I usually put them on a hook by the door, but they aren't there. They could be in the junk drawer, the car, the kitchen, my clothes, or somewhere else. Since they weren't on the hook, they're probably in the car.

Hypothesis	Prior
Car	52.6%
Drawer	10.5%
Kitchen	10.5%
Clothes	21.1%
Elsewhere	5.3%

I look in the car first since it seems most likely that I'll find my keys there. But the keys aren't in the car. I think. If they were there, there's a 75% chance I'd find them (there are a lot of nooks and crannies in a car). So there's a 25% chance that I missed them. If the keys are actually elsewhere, then of course I wouldn't find them in the car.

Evidence: not found in car			
Hypothesis	Prior	Likelihood of not being found in car	Posterior
Car	52.6%	5.9%	21.7%
Drawer	10.5%	23.5%	17.4%
Kitchen	10.5%	23.5%	17.4%
Clothes	21.1%	23.5%	34.8%
Elsewhere	5.3%	23.5%	8.7%

So next I look in my clothes. Still no keys. I'm quite sure I'd find the keys if they were actually there. There's maybe a 2% chance I'd miss them.

Evidence: not found in clothes			
Hypothesis	Prior	Likelihood of not being found in clothes	Posterior
Car	21.7%	24.9%	33.0%
Drawer	17.4%	24.9%	26.4%
Kitchen	17.4%	24.9%	26.4%
Clothes	34.8%	0.5%	1.1%
Elsewhere	8.7%	24.9%	13.2%

Back to the car. Even though I've already looked there, its prior probability was higher, and I didn't do a super-thorough search the first time. Now I'll really go over it with a fine-tooth comb. There's only a 5% chance I've missed my keys now. But they're still not there.

Evidence: not found in car again			
Hypothesis	Prior	Likelihood of not being found in car again	Posterior
Car	33.0%	1.2%	2.4%
Drawer	26.4%	24.7%	38.4%
Kitchen	26.4%	24.7%	38.4%
Clothes	1.1%	24.7%	1.5%
Elsewhere	13.2%	24.7%	19.2%

On to the kitchen or the junk drawer. The kitchen is easier, so I'll start there. I do a quick scan of the surfaces and don't see the keys. But I'd only expect to see them maybe 1 in every 3 times (33.33% of the time) I do this kind of cursory check.

<b>Evidence: not seen in kitchen</b>			
Hypothesis	Prior	Likelihood of not being seen in kitchen	Posterior
Car	2.4%	23.1%	3.2%
Drawer	38.4%	23.1%	51.7%
Kitchen	38.4%	7.7%	17.2%
Clothes	1.5%	23.1%	2.1%
Elsewhere	19.2%	23.1%	25.8%

I guess now I'll finally check the drawer. No keys! It's a complete mess, so I'm only 40% sure I haven't missed them.

<b>Evidence: not found in drawer</b>			
Hypothesis	Prior	Likelihood of not being found in drawer	Posterior
Car	3.2%	21.7%	4.1%
Drawer	51.7%	13.0%	39.1%
Kitchen	17.2%	21.7%	21.7%
Clothes	2.1%	21.7%	2.6%
Elsewhere	25.8%	21.7%	32.6%

What? The drawer again? A much more thorough search finally turns up the keys.

<b>Evidence: found in drawer</b>			
Hypothesis	Prior	Likelihood of being found in drawer	Posterior
Car	4.1%	0.0%	0.0%
Drawer	39.1%	100.0%	100.0%
Kitchen	21.7%	0.0%	0.0%
Clothes	2.6%	0.0%	0.0%
Elsewhere	32.6%	0.0%	0.0%