

Weber's Law¹ – chapter 5

mentioned only briefly in text Section 5.1 Sensation

Imagine hearing a tone played at 20 decibels. Then someone wonders just how much louder a second tone would have to be in order for you to detect that they are different. At 21 decibels you might not be able hear they are different. Same at 25. What if it takes the second one to be 30 decibels in order to detect they are different. That 10 db difference is called the difference threshold or the just noticeable difference (JND). Weber's law says that the JND depends on the intensity of the original stimulus. For example given the hypothetical numbers mentioned above, if you started with a 100 db sound, that 10 db difference isn't enough to detect the difference.

Weber gave us a law that says: the size of a JND is proportional to the intensity of the original stimulus. The JND is large when the original stimulus intensity is high and is small when the original stimulus intensity is low. His formula is as follows:

How to do some computations:

You need to be able to make ratios and solve for an unknown (x).

Case 1. An original stimulus is 50 db and the JND is 10. What is the JND if the stimulus is 100 db?

Make a ratio: $\frac{JND}{Stimulus} = \frac{JND}{Stimulus}$, therefore $\frac{10}{50} = \frac{x}{100}$. X then (the new JND) = 20. So it would take a sound to be 120 db to detect is larger than one that is 100 db.

Case 2. Restating the same problem from Case 1, we could ask: If the original stimulus is 50 db and a second one has to be 60 to detect it is louder (because the JND was 10), then if we started with one 100, how large would the second one have to be to detect it is larger?

Make a ratio: $\frac{Stimulus\ 1\ Intensity}{Stimulus\ 2\ Intensity} = \frac{Stimulus\ 1\ Intensity}{Stimulus\ 2\ Intensity}$ or $\frac{50}{60} = \frac{100}{x}$, and x = 120.

Putting this In Your Own Words

- The *more intense* something is, the *harder* it is to notice a change, but if the *intensity is lower*, it is *easier* to notice the change.
- The *louder or brighter* something is, the *more change* is needed to notice the difference.
- The *more* there is of something, the *more change* is needed to pass your difference threshold, whereas the *less* there is of something, *less change* is needed to pass your difference threshold.
- The *more intense* the stimulation is, the *more* of a change is needed to be able notice the difference.

Examples

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- If the volume of a television is high, turning it down by a few decibels will not be a very big difference.
- When you start with 50 cans of soda, the sample size is large, if someone drinks a soda it will be harder to notice a missing soda. As the sample size gets smaller, 2 cans, when someone drinks a soda it is easier to notice a soda missing.
- If you are benching a weight of 200 pounds you wouldn't notice if 5 pounds were added, but if 20 pounds or more were added the person benching would now be able to tell the difference in the weight.
- If you add hot pepper to something that is not spicy AT all, you will notice the change after only using a little bit. Whereas, if you are adding hot pepper to something that already has a kick to it, it will take more and more hot pepper to finally get you to notice a difference.
- Changing the brightness level on your cell phone. If the brightness of the screen is intense, the dimmer the screen needs to be. If the screen is very dim already, it only needs a slight adjustment for the screen to appear brighter.
- You are driving. You notice the difference from being completely stopped to moving 5 miles per hour. But when you are driving on the highway you don't notice a 5 mph increase from 60 to 65.
- You are upstairs jamming to your favorite music out MAX volume of 30. Your mom says it is too loud and you need to turn it down. Turning the volume down A LOT will be easy to notice. But if you only turn it down a few punches it will seem extremely loud still.
- When a tree changes color in winter and becomes really bright (such as the one on our school grounds), it's still changing color daily but it is harder to notice than when it was a less intense color.
- When your at the movies and your Iphone screen is really bright, you go to brightness to dim it down until its less noticable to the people surrounding you.
- When you have a messy room, picking up one or two items isn't noticeable, however when you clean up 15 items the room will start to look less messy.
- A pickpocket. For Example, if you were a pickpocket, the perfect time for you to steal something would be in a very large crowd of people because then, the person you are pickpocketing will mostly likely not notice the small change in weight in their left pocket. However, if you were to try and steal from someones pocket in a much smaller crowd of 10-15 people, it would be much easier to notice the change and you would most likely get caught. (and no one wants to be a terrible pickpocket)
- when you are sitting at home watching TV if your listening to the television on its max volume of 55 because it was hard to hear with all the backround noise you wont notice someone turn it down to a max of 50 because you didnt see them physically do it and your not just paying attention to the T.V but to the people talking in the back also, but if you were to watch them while they turn it down you would notice the diiffrence in how loud it was because your focused on the sound coming out of the T.V and you see the volume bar getting lower so your body will react to it.
- When you are taking 6 bags of groceries in the house and someone adds another bag you wouldn't notice it because of [Weber's Law](#).

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