

## **Webber's Law**

**By Paul Doggett**

Ernst Webber conducted experiments during the 1800's on human perception. His experiments had nothing to do with trading, but the results of one of these experiments are applicable to share traders today. The experiment we are interested in went like this: Webber blindfolded a man and asked him to hold onto a weighted object. Webber gradually increased the weight and directed the man to tell him when he began to feel this increase.

What Webber discovered was that the smallest noticeable difference in weight was proportional to the starting value of the weight. For example, if the starting weight is 2 kg, then one additional gram was barely noticed by the person carrying that weight, but 0.2 grams added to a 2kg weight did become noticeable. For 5kg, the threshold of noticeable increase in weight is 0.5 grams.

The proportional increase in weight relative to the original weight being carried was the important thing in his research and this relationship came to be known as Webbers' Law.

So how does it apply to traders?

It applies in risk management. Let's assume you put \$1000 into a position and you lose \$100. You are down 10%. Most people can handle the loss at this point. It is the equivalent of only 1 additional gram being placed onto a 2kg weight – barely noticeable. However, if you lose \$200, you are down 20% and at about this point, many more people would start to feel the pain of the loss. Your risk threshold or tolerance level is beginning to be tested because the loss is proportional to the starting capital. At this point you have to decide whether to sell and take the loss or hold on and hope that the stock will bounce back.

Now let's say you put \$5000 into a position and you lose \$100. You are no longer down 10% and are less likely to worry about the \$100 deficit in your position given the small value of \$100 relative to your starting position of \$5000. If the stock continues to fall and you are down \$200, you do not reach the same feeling of loss at the same threshold level and therefore you do not reach the pivotal decision point of whether you need to sell or hold as you did in the previous example.

Webber's law states that your inflection point - or point of noticeable stimulus is proportional to the beginning level of weight you are carrying or in trading terms, the amount of money we put into a stock. You can see the importance of the proportional relationship in Webber's law when it comes to deciding on your position size and how this will affect your ability to notice any losses that you are incurring. Someone with a \$5000 position size requires a lot more stimulus to feel weighed down by a loss than the person with a \$1000 position size. The trader with a \$5000 position size is typically going to lose more money per losing trade in dollar terms than the trader with a \$1000 position size if both traders act in accordance with Webber's Law and exit once their respective positions have retreated by about 20%.

Subsequently, the trader with the larger position size is going to have to make proportionally greater profits to not only make back the lost money on losing trades, but to make sufficiently more money to be in front by the end of the trading year. With this in mind, let's consider Webber's law as it relates to exiting profitable positions.

Let's assume a trader with a \$1000 position size finds himself \$200 or 20% in front on a trade. It is feasible that due to Webber's law, the stimulus threshold will be met – that is, the additional \$200 on top of the \$1000 opening position size makes the overall position worthwhile to cash in. So the trader takes the profit off the table. The trader has reached his pivotal decision point of where the stimulus (the profit) has become noticeable enough to force the trader to act in response to the change in weight (or dollars as is the case in our trading example).

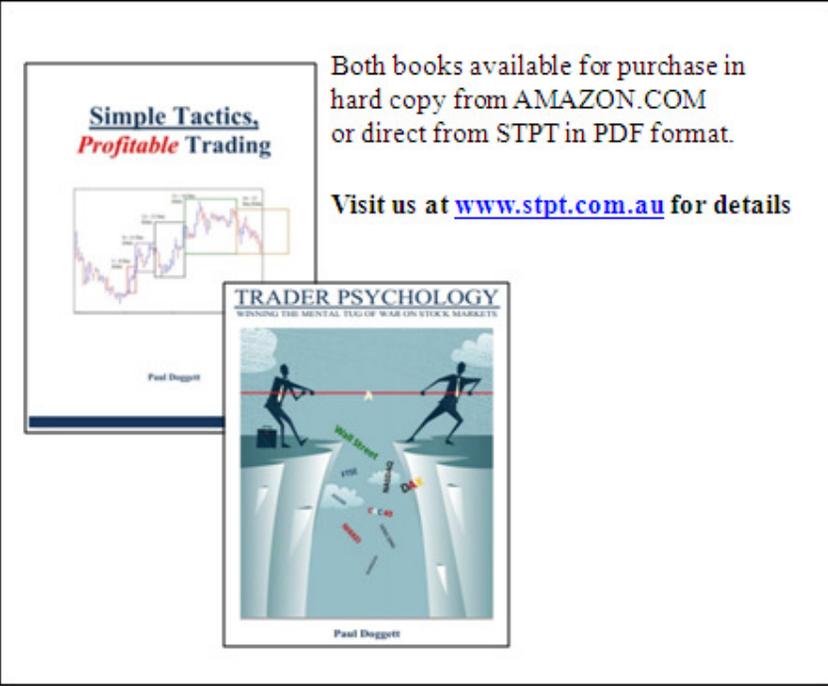
A trader with a \$5000 position size might be more likely to sell his or her position to capture a profit of 20% or \$1000 because the stimulus (profit) has become noticeable enough to force the trader to respond. He has reached that pivotal decision point based on the proportional relationship as outlined in Webber's law.

In both cases where a profit has been made, it is possible that the traders sold too early and didn't capture a greater portion of the total amount of profit on offer. Perhaps the trader with the \$1000 position could have made \$500 or 50%, but due to Webber's law, exited when he was 20% in front because this is where the stimulus or profit became very noticeable and attractive to the trader. Likewise, the trader with the \$5000 position size could have perhaps made \$2500 profit instead of \$1000 but again, due to the same reasons as the previous trader, he or she took an early profit.

In trading terms, we need to realize that we are bound to feel the stimulus of a profit (or additional weight), as a proportion of our position size, but we may need to ignore the instinctive reaction to act upon that stimulus and sell the position to lock in the profit. Greater profits may await us if we can learn to control our instinct to sell early in response to the stimulus.

The traders in these examples don't consciously make decisions because of Webber's law, but Webber's law can help us to understand the importance of position sizing. If we have an excessively large position size and we are not disciplined in risk management and stop-loss strategies, we won't necessarily exit the position until we have an excessively large loss because we won't feel the stimulus generated by the loss as a proportion of the position size until the loss becomes large. On the other hand, if we are equally undisciplined and fail to let our profits run, we may be inclined to take early profits because of the size of the profit as a proportion to the position size that we started with.

The moral of the story concerning Webber's law is that we must ultimately decide at what profit level our temptation kicks in. Do we let our profits run and suppress our temptation to take early profits or not? It is a pivotal question that is often discussed and I hope to have provided a different take on how you can look at profits and losses as a proportion of position size.



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