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14

Reciprocity Failure

Why do some trainees produce good results from weight-training, while others – using apparently identical program and exactly the same equipment – experience such slow rates of progress that they eventually stop training in disgust?

A tricky question, obviously – and one that cannot be answered in general terms that apply in all cases; but in most cases, the real culprit is a factor that most bodybuilders never heard of, reciprocity failure – which might be defined as the failure to produce expected results. Which definition is not quite as meaningless as it may appear at first glance –although it is one that will require careful explanation.

To readers well versed in the technicalities of photography, the term may be familiar in another context, and my first attempt at an explanation will be based on an example from that field.

Correct exposure of film depends upon several factors; the so-called "speed" of the film being used, the type of light source, the length of time that the film is exposed, and the relative size of the lens aperture, as well as other factors which are of no importance in this example. But in practice, the average photographer is usually concerned with one or two of the above factors; the length of exposure and the size of the lens aperture – or "shutter speed" and "f stop".

If one of these factors is changed, then the other must be changed in exact proportion; if exposure time is doubled, then the aperture must be reduced in area by fifty percent – and so on. And in almost all cases, if this relationship is maintained, the result will be the same insofar as exposure is concerned. More time, less light – or more light, less time; the same exposure in either case.

But the formula doesn't always work. As either end of the scale is approached, it will be observed that actual exposure will always be less than that which was expected from the combination of exposure time and lens aperture being used; never more – always less. If extremely long exposure times are used, then the resulting exposure will be less than that which was indicated by the formula; and if very short exposure times are used, the result will again be underexposure. And this result will be produced in spite of the fact that the formula being used is accurate; or, at least, is accurate within a certain area.

When such a result is produced, it is called "reciprocity failure". The produced result failed to live up to expectations – even though the formula used was correct.

And a very similar factor is encountered in bodybuilding – or in physical training of any kind. Thus, in practice, we find that doubling the length of a workout will not give as much in the way of results – and that a set of one repetition will not produce ten percent of the results of a set of ten repetitions.

But, many weight-trainees seem to think that merely doubling the number of sets, or the number of exercises, will also double their rate of progress; such thinking has led to the recently proposed "total tonnage" theory, a theory which suggests that the only factor of importance is the total amount of weight lifted during a workout – but a theory which, in fact, is so ridiculous that it doesn't even deserve rational consideration or discussion. And please don't write me to state that "...nothing is undeserving of ration consideration." What about the theories of the Flat Earth Society, the people who still don't believe that this planet is a sphere?

However, for the benefit of those readers who might have much background in physics, I will point out that the Total Tonnage theory ignores the factors of vertical distance of movement, and speed of movement – without which factors, no reasonable discussion of power or strength is even possible. And it also ignores the factor of reciprocity failure – which the inventor of the Total Tonnage theory probably never heard of, and certainly doesn't understand.

So much for theory; but just how does this factor apply to physical training in a practical manner?

In simple terms, it can probably best be understood in much the same context that applies in the previously mentioned example from photography; within a certain range – on a certain scale – then the production of results can be calculated with a rather high degree of accuracy, but the upper and lower limits of that scale must be understood and allowed for. In practice, in very simple terms, this means that either "too much" or "too little" exercise will have much the same final results – and that in both cases, these results will be poor.

It also means that the production of best-possible results depends upon a clear understanding of this scale; the trainee must be aware of the limitations – and must stay inside the bounds of most-productive work.

And while a complete understanding of this factor is not going to result even if you memorize this entire bulletin, a practical understanding probably will be reached by readers who take the trouble to read it carefully and with an open mind.