

## HIAWATHA DESIGNS AN EXPERIMENT<sup>1</sup>

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Hiawatha, mighty hunter,  
He could shoot ten arrows upwards  
Shoot them with such strength and swiftness  
That the last had left the bowstring  
Ere the first to earth descended.  
This was commonly regarded  
As a feat of skill and cunning.

One or two sarcastic spirits  
Pointed out to him, however,  
That it might be much more useful  
If he sometimes hit the target.  
Why not shoot a little straighter  
And employ a smaller sample?

Hiawatha, who at college  
Majored in applied statistics,  
Consequently felt entitled  
To instruct his fellow men on  
Any subject whatsoever,  
Waxed exceedingly indignant  
Talked about the law of error,  
Talked about truncated normals,  
Talked of loss of information,  
Talked about his lack of bias,  
Pointed out that in the long run  
Independent observations  
Even though they missed the target  
Had an average point of impact  
Very near the spot he aimed at  
(With the possible exception  
Of a set of measure zero).

This, they said, was rather doubtful.  
Anyway, it didn't matter  
What resulted in the long run;  
Either he must hit the target  
Much more often than at present  
Or himself would have to pay for  
All the arrows that he wasted.

Hiawatha, in a temper,  
Quoted parts of R. A. Fisher  
Quoted Yates and quoted Finney  
Quoted yards of Oscar Kempthorne  
Quoted reams of Cox and Cochran  
Quoted Anderson and Bancroft  
Practically *in extenso*  
Trying to impress upon them  
That what actually mattered  
Was to estimate the error.

One or two of them admitted  
Such a thing might have its uses.  
Still, they said, he might do better  
If he shot a little straighter.

Hiawatha, to convince them,  
Organized a shooting contest  
Laid out in the proper manner  
By experimental methods  
Recommended in the textbooks  
(Mainly used for tasting tea, but  
Sometimes used in other cases)  
Randomized his shooting order  
In factorial arrangements  
Used the theory of Galois  
Fields of ideal polynomials,  
Got a nicely balanced layout

<sup>1</sup>Reprints may be obtained from the author, Scientific Control Systems Limited, Sanderson House, 49-57 Berners Street, London W1P 4AQ England.

And successfully confounded  
Second-order interactions.

All the other tribal marksmen  
Ignorant, benighted creatures,  
Of experimental set-ups  
Spent their time of preparation  
Putting in a lot of practice  
Merely shooting at a target.

Thus it happened in the contest  
That their scores were most impressive  
With one notable exception  
This (I hate to have to say it)  
Was the score of Hiawatha,  
Who, as usual, shot his arrows  
Shot them with great strength and swiftness  
Managing to be unbiased  
Not, however, with his salvo  
Managing to hit the target.  
There, they said to Hiawatha  
That is what we all expected.

Hiawatha, nothing daunted,  
Called for pen and called for paper  
Did analyses of variance  
Finally produced the figures  
Showing, beyond peradventure,  
Everybody else was biased  
And the variance components  
Did not differ from each other  
Or from Hiawatha's  
(This last point, one should acknowledge

Might have been much more convincing  
If he hadn't been compelled to  
Estimate his own component  
From experimental plots in  
Which the values all were missing.  
Still, they didn't understand it  
So they couldn't raise objections.  
This is what so often happens  
With analyses of variance.)

All the same, his fellow tribesmen  
Ignorant, benighted heathens,  
Took away his bow and arrows,  
Said that though my Hiawatha  
Was a brilliant statistician  
He was useless as a bowman.  
As for variance components,  
Several of the more outspoken  
Made primeval observations  
Hurtful to the finer feelings  
Even of a statistician.

In a corner of the forest  
Dwells alone my Hiawatha  
Permanently cogitating  
On the normal law of error,  
Wondering in idle moments  
Whether an increased precision  
Might perhaps be rather better,  
Even at the risk of bias,  
If thereby one, now and then, could  
Register upon the target.