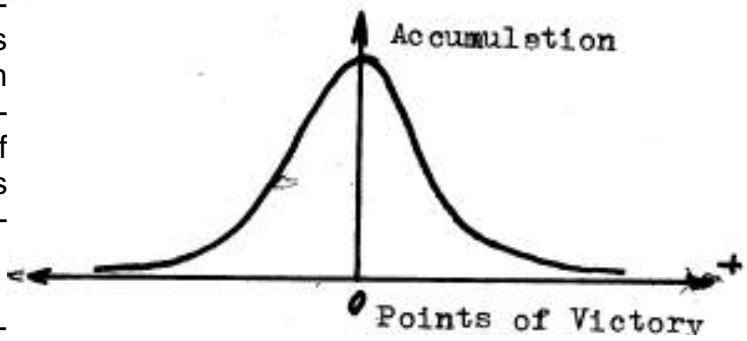
Introduction:

By playing tournaments,players strength,and the best players, are determined. Especially with Go it turns out to be practical to give each player a rating of his strength and overcome different ratings by playing with handicapstones. - It is a well known fact, that in different places ratings of a player may be different,as well as sometime ago ratings were considered differently,compared to nowadays ratings.
As a matter of fact statistics of the outcome of a game always represents a certain degree of chance and error. Thereby the game keeps up interest and motivation. But - vice versa - by such a property of fluctuation, players strength is hard to be exactliand even worse, it may change considerably in different countries.

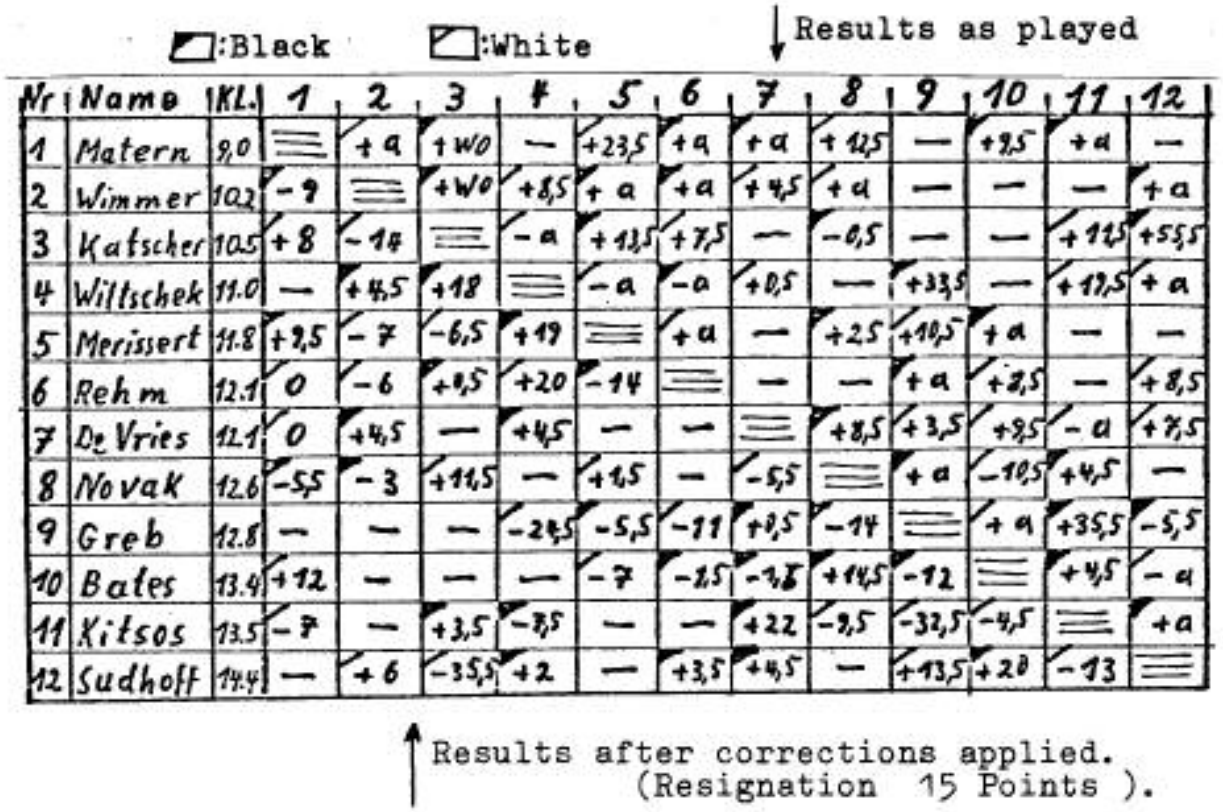
Hereby we try to describe a procedure using the statistics of fluctuation of games-result that prevails up to now to determine player´s strength independently from time, and place.

The Method of Evaluation:

It is known for long time,that performance of game not only decides victory but as well the amount of points of gain. It is as well known,that with opponents (of approximately equal-strength) chances and amount of gain fluctuation in a typical way, as characteristically for statistical-random processes.



It has been observed for week players to produce a large scattering with highs of victory or loss, whereas for strong players the margin of points for victory and defeat will be much less. This observation may readily be used, for calibration of the ranking of players' strength. For this purpose it only is necessary to look at the results of as many games ave possible especially with respect to hight of gain. The best procedure to do this may be to evaluate results of a tournament of many rather equally in strength-participants:

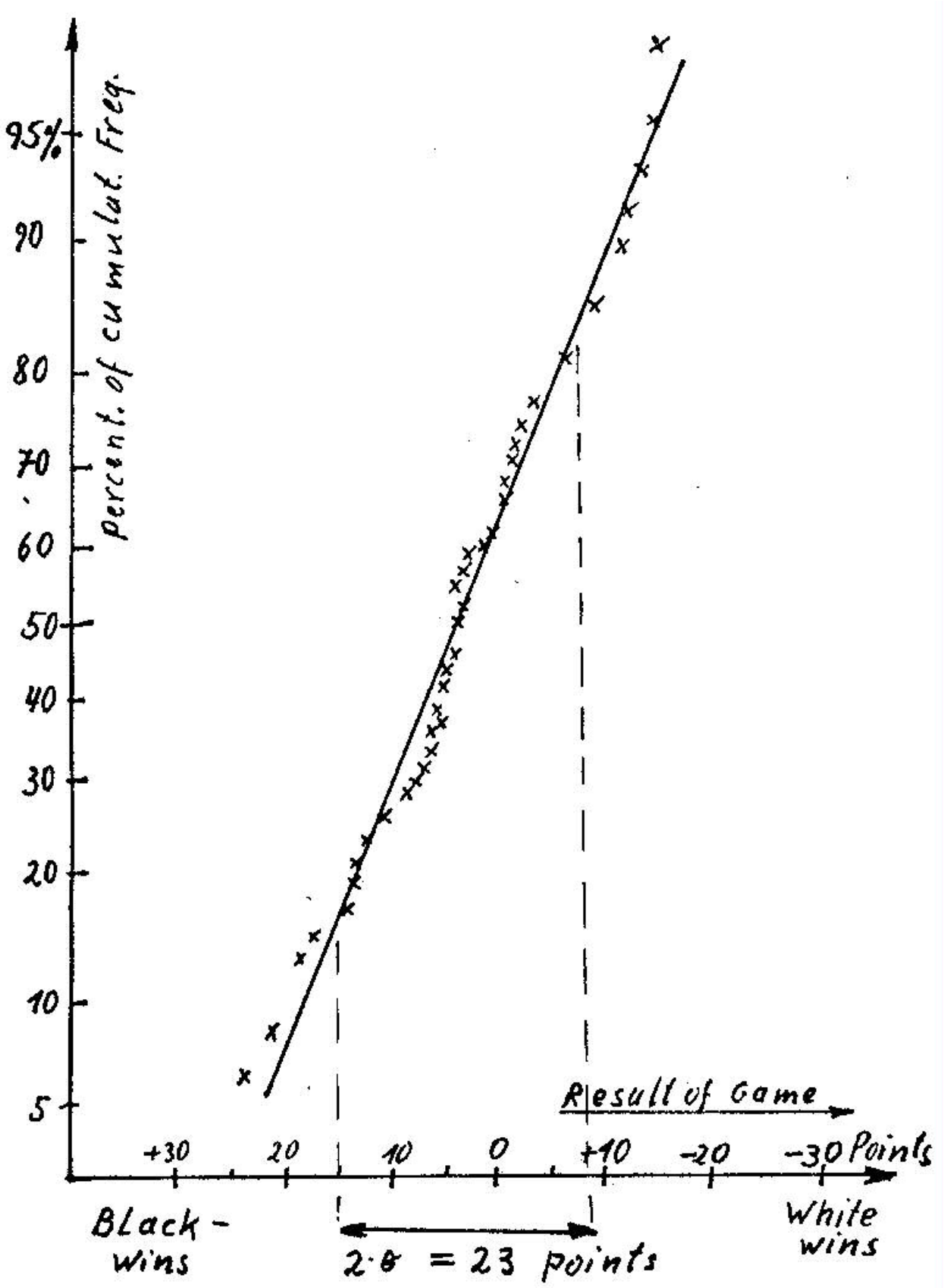


Nr	Name	Kl.	1	2	3	4	5	6	7	8	9	10	11	12
1	Matern	9.0	=	+a	+W0	—	+23,5	+a	+a	+12,5	—	+9,5	+a	—
2	Wimmer	10.2	-9	=	+W0	+8,5	+a	+a	+4,5	+a	—	—	—	+a
3	Katscher	10.5	+8	-14	=	-a	+13,5	+7,5	—	-0,5	—	—	+12,5	+55,5
4	Wiltschek	11.0	—	+4,5	+18	=	-a	-a	+0,5	—	+33,5	—	+17,5	+a
5	Merissert	11.8	+2,5	-7	-6,5	+19	=	+a	—	+2,5	+10,5	+a	—	—
6	Rehm	12.1	0	-6	+0,5	+20	-14	=	—	—	+a	+2,5	—	+8,5
7	De Vries	12.1	0	+4,5	—	+4,5	—	—	=	+8,5	+3,5	+9,5	-a	+7,5
8	Novak	12.6	-5,5	-3	+11,5	—	+1,5	—	-5,5	=	+a	-10,5	+4,5	—
9	Greb	12.8	—	—	—	-24,5	-5,5	-11	+0,5	-14	=	+a	+35,5	-5,5
10	Bates	13.4	+12	—	—	—	-7	-2,5	-3,5	+14,5	-12	=	+4,5	-a
11	Kitsos	13.5	-7	—	+3,5	-8,5	—	—	+22	-9,5	-32,5	-4,5	=	+a
12	Sudhoff	14.4	—	+6	-35,5	+2	—	+3,5	+4,5	—	+13,5	+28	-13	=

As in most cases ideal statistic conditions rarely are fulfilled, corrections should be installed in respects to imperfect material:

1. Corrections for different strength of participants:
For 1 Dan, or 1 Kyu difference in strength, that is one handicapstone, it is counted with the equivalence of 10 points. For example: a player 4 Dan (W) wins by 12 points against 3 Dan(Bl) As there is 1-Dan difference in strength, the victory of white is worth 10 points less. However Black has to give 5 stones komi for the first move. Thereby the effective amount of the white victory is to count. 12 - 10 + 5 = 7 points.

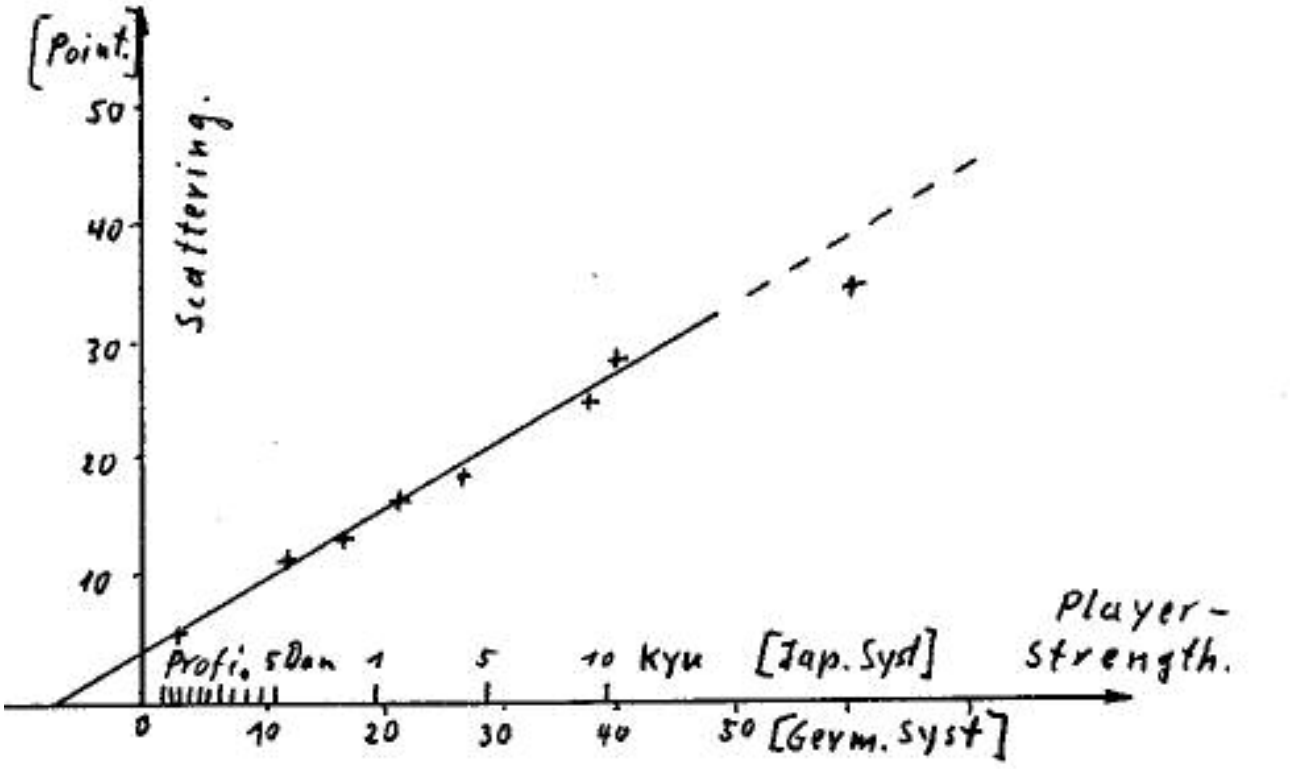
2. Many players give up the game before the end really may be counted. But it seems sound and reasonable, that weaker players only notice a game to be lost by a big margine, stronger players counting the moves precisely give up by a smaller margin. It is estimated that a game,lost by resignation,is worth to be counted in points ca.=the strength of the player in German scaling. (rating): For example: 1 Dan(Bl) plays against 1 Dan (W) and gives up: that is 1 Dan ca. 18 strength (German). Thereby the victory should be counted as 18 points. With those corrections the results of tournaments may be evaluated quite well. It is especially of avail to plot the statistical results in a scale of probability - units :



The standard deviation "s" of seattening may be directly read from the curve looking from the seal of 50 % to 16,5 % .- It is here = 11,5 points. This means, that within this range, 2/3 of all games are like to be won by players of 4 to 5 Dan strength.

A Number of toumaments and a lot of games have been, evaluated by the method. For each averaged strength its standard deviation has been determined. Over the entire

range of player´s strength a good coordination of respective values is apparent.



As can be seen by the coherence between scattering of defeat,and strength of player it appears to be linear and reproducible by sufficient many points of measurement, within a sufficient range from 9 -Dan to 10-Kyu of players' strength so that we may propose:

The close and direct coherence-between the width of scattering and strength of players,-may be used for classification and ranking purposes as an absolute and objective bases.

It will be possible, separately in each country and even in a club to fix the scaling by the method described. The only necessary condition for this is a sufficiently large and from statistical point of view clean registration of results of games that will be possible in larger clubs within a couple of months.
Conclusion:
a) The function,that has been shown by the given data above, may even be expressed in mathematical terms.

$$s=\frac{1}{2}(K+8)$$

The mean standard deviations is a function of player´s strength "K" (German Klassifieation) in German units.
b) It is rather interesting to note that there does exist a limit where no scattening does occure any more. This may be considered
as the absolute best game. (hypothetioal). This is to be found at a distance of ca.: 2 handicapstones for a 9 - Dan profi.
c.)It will be possible to extend the statistioal method and thereby the scaling;-for grades lower than 10-Kyu. In fact it is of very high interest to study those lower ranks for theoretical reasons. However due to the very large degree of scattering it is necessary to undergo a tremendous amount of statistical work!
It has to be conceded, that the shown measurements ought to be augmented by more statistical material in order to be still more precise. /-'--
The initiation has begun by Dr.Walter Schmidt(Timisoara). Much material has been con-

tributed by Ing.Walter Zickbauer.
(Krems) and Dr.K.J.Fleischer(Frankfurt). I have to thank for their willing help and unselfish advice. It must be uttered however that nearly all tournament organisations,-by dispairing ignorance,-frustrated all efforts to advance and organize more detailed and more exaet statistical material.

Klaus Heine

