

A COMPUTER-AIDED COMPARISON OF THE PLAYING PATTERN OF THE WORLD'S TOP MALE PLAYERS AND AUSTRIAN TOP MALE PLAYERS IN SINGLE BADMINTON

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1 Introduction

The purpose of this study is to highlight the technical components of badminton games using a specific computer program for data analysis. Differences between international top players and Austrian top players shall be worked out in order to find, in what areas the Austrian top players should improve technical and tactical training.

The author wants to establish a profile of the world's top players and their Austrian counterparts and to contrast the two groups. The following questions shall be investigated:

- Which differences between the two groups of players can be observed?
- What are strong and weak points of the Austrian players compared to the international top twenty?

Some results shall be compared with the data of earlier studies (e.g. Bochow, 1989 or Hong and Tong, 2000). In this way the technical development of badminton in the last years can be shown.

2 Methods

The author has videotaped matches of the Austrian top players (players in the Austrian top twenty ranking for male single badminton as recorded in May 2006) in the year 2005 and 2006. These matches and videos of international players (top 20 world ranking as recorded in May 2006) from the year 2005 and 2006 were analysed. 20 games of international top players and the same amount of games of Austrian top players were evaluated. This summed up to approximately 20.000 strokes of international players and 13.000 of Austrian ones.

Data were analysed with a specific computer program based on MS Access®. The program used is capable of analysing most kinds of ball games and was adapted to be applicable in badminton. The following attributes were selected:

- The position of the player: the centre line, short service line and the long service line divide the court in six areas. Thus a total of six different areas were available for recording the moves of the players. The six areas are:

right forecourt, left forecourt, right midcourt, left midcourt, right rearcourt and left rearcourt.

- Kind of stroke: backhand, forehand, drop, smash, drive, clear, swip
- Direction of stroke: longline, diagonal
- Effectiveness: neutral shots, effective shots, ineffective shots and lucky shots
- Height where the ball was hit: underhand, sidehand, overhand

When entering the data describing the game process, it was also recorded, if a stroke was a service, and if it resulted in a fault or a point. In addition, the number of each stroke, the name of the playing person, sets and points, playing time and the ranking of the players were collected.

In order to investigate the objectivity of the model five persons were taught how to work with the computer program. Each of them had to analyse three sets of a game. The collected data were tested for objectivity by calculating Cohen's kappa. The mean value of Cohen's kappa over the several attributes was 0,896 with a range from 0,754 to 1. This shows that the model has a high degree of objectivity (Lames, 1990, p. 103).

3 Results

All the games in this study were counted in the English scoring system. Further analyses of games using the new point-per-rally system will be made to investigate if there are changes in the playing pattern. Table 1 shows basic statistics about the analysed data of the forty games.

Table 1. Basic statistics of the investigation

	International top players	Austrian top players
analysed games	20 games	20 games
total strokes	19.965 strokes	13.072 strokes
average playing time	53 minutes	34 minutes
effective playing time	27 minutes	16 minutes
maximum rallylength	43 strokes	43 strokes
rallies per game	104,6 rallies	97,8 rallies
strokes per rally	8,0 strokes	5,9 strokes

The main differences between international top players and Austrian top players are that the latter have fewer rallies per game and fewer strokes per rally on average. Consequently they have less total strokes and shorter playing time.

More than 52 % of the rallies of the Austrian players last only one to four strokes. International top players perform longer rallies. 35,6 % of the rallies have

more than nine strokes. At the time of the study of Bochow (1989, p. 57) the international top players had 31,3 % rallies which lasted more than nine strokes.

Table 2. Strokes per rally

strokes per rally	International top players	Austrian top players	Internat. top players (Bochow, 1989)
1 to 4	39,0 %	52,3 %	39,1 %
5 to 8	25,5 %	25,3 %	29,7 %
9 to 12	15,2 %	11,6 %	14,3 %
13 to 16	9,0 %	5,7 %	7,4 %
over 16	11,4 %	5,1 %	9,6 %
average	8,0 strokes per rally	5,9 strokes per rally	8,2 strokes per rally

In the following paragraphs some results regarding the service, return and rally shots shall be analysed.

The service

Differences of the service strokes between the two analysed groups are shown in Figure 1.

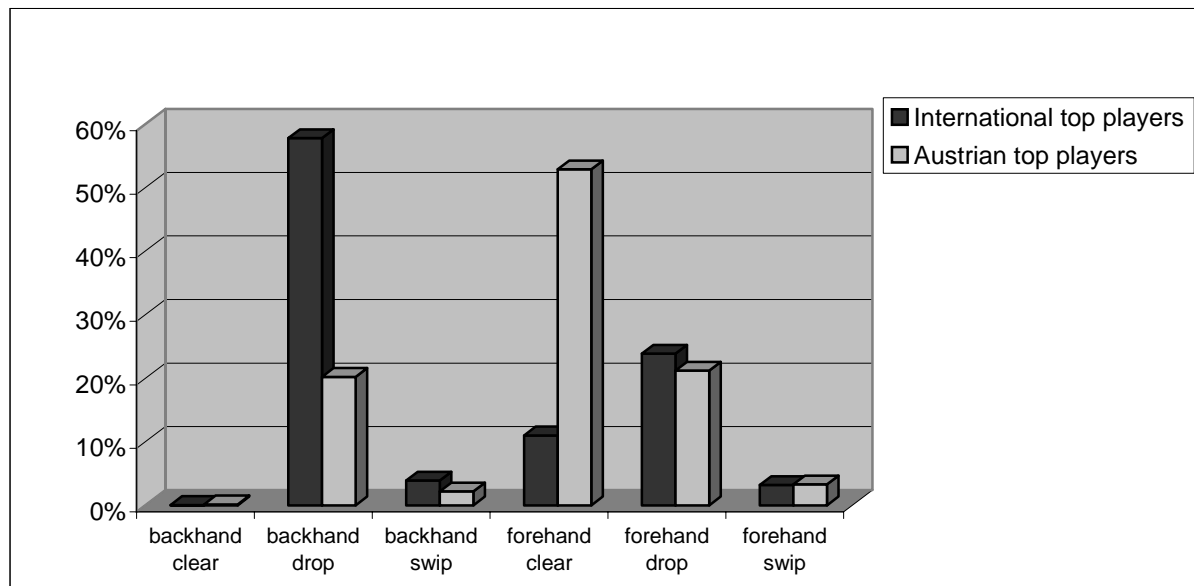


Figure 1. Kind of service strokes

Nearly 80 % of the services of international top players are backhand or forehand drops. The Austrian top players use just 40 % drops and tend to forehand clears in more than 50 % of the services. Compared to a study by Hong

and Tong (2000, p. 190) the international top players play more short services than in the year 2000.

The return

International top players return 53 % of the long services with a smash. Austrian top players react in the same situation with 35 % smashes only. They play 35 % attack clears whereas the international top players use only 11 %. This shows the offensive playing pattern of the world class.

Looking at the returns of short services there are a few main differences between the two groups. 51 % of the returns of short services in the international top players' group are drops and 39 % are swips. The Austrian top players use the drop in only 43 % and the swip in 50 %.

Analysing the faults and points during the return (Figure 2) international top players make most of their points hitting smashes and faults hitting underhand drops. The Austrian top players make most of their faults with the underhand drop and most of their points by hitting smashes.

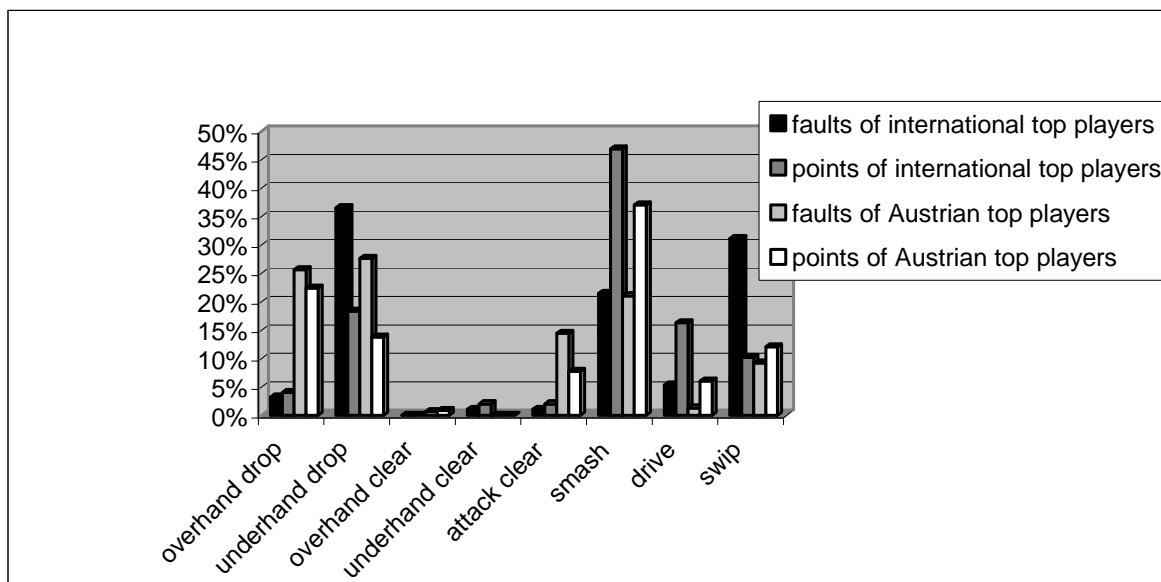


Figure 2. Faults and points during the return

The rally shots

International top players use more underhand clear, underhand drop, drive, smash and swip shots compared to the Austrian top players (Figure 3). The Austrian athletes prefer overhand clear, overhand drop and attack clear shots. The most dominant shot in both groups is the underhand drop followed by overhand drop, smash and swip shots.

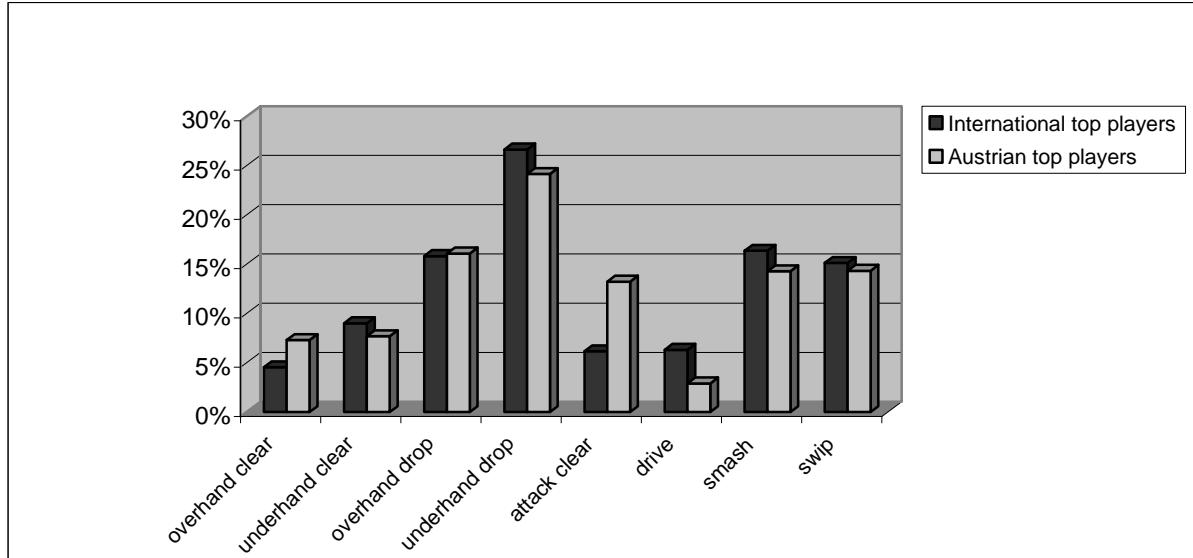


Figure 3. Kind of strokes during the rally

Figure 4 gives an overview of the height of the strokes depending on the court position of the players. It is obvious that the international top players perform more shots in the net area hitting underhand shots. The Austrian top players hit more strokes in the middle overhand area. It is assumed that the Austrians do so because they often play long balls too short (Figure 5). Per definition long balls should be played in the rearcourt to have optimal length. Too short shots are returned in the midcourt. Figure 5 shows that the Austrian top players do not use optimal length shots as often as the international players and secondly that they play too short shots more often. In the situation of attack clear and swip the Austrian top players mostly use too short strokes. This shows that under training conditions the Austrians should exercise optimal long strokes.

	Austrian top players 9.225 strokes				International top players 15.819 strokes		
overhand	22,9	18,5	0,2	0,3	8,7	23,9	overhand
sidehand	2,0	8,2	1,8	2,2	11,4	2,3	sidehand
underhand	0,5	28,9	16,8	21,0	29,7	0,5	underhand
			net				

Figure 4. Shot frequencies in different areas

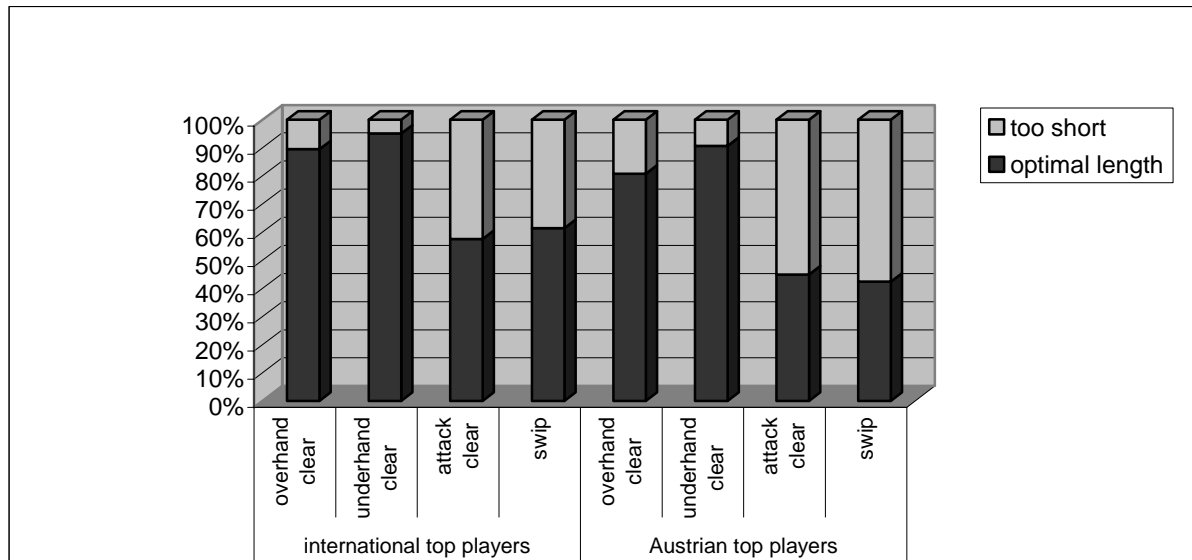


Figure 5. Distribution of too short and optimal long strokes

Next the stroke frequencies in the different court areas are discussed. The questions are:

- How often does a stroke occur in a certain area?
- What kinds of stroke are used in these areas?

Most strokes are played in the midcourt area, concentrating with over 25 % on left midcourt. The rearcourt is in second place followed by the forecourt. It is interesting to investigate the different kinds of stroke used in the different court areas. Table 3 shows the distribution of strokes.

Table 3. Distribution of strokes in the different court areas

position of the players	International top players			Austria	
	kind of stroke	distribution in percent	strokes in defined area in percent	kind of stroke	distribution in percent
left rearcourt	clear	12,7 %	12,8 %	clear	17,8 %
	drive	1,1 %		drive	00,0 %
	drop	34,1 %		drop	25,3 %
	smash	37,7 %		smash	26,6 %
	attack clear	14,4 %		attack clear	30,3 %
right rearcourt	clear	11,2 %	14,0 %	clear	12,7 %
	drive	1,5 %		drive	0,8 %
	drop	32,7 %		drop	33,5 %
	smash	41,0 %		smash	24,0 %
	attack clear	13,7 %		attack clear	29,1 %
left midcourt	clear	5,9 %	26,0 %	clear	10,3 %
	drive	10,5 %		drive	3,5 %
	drop	53,1 %		drop	44,6 %
	smash	7,9 %		smash	13,1 %
	swip/ attack clear	22,6 %		swip/ attack clear	28,4 %
right midcourt	clear	5,4 %	23,8 %	clear	7,8 %
	drive	10,0 %		drive	5,2 %
	drop	49,8 %		drop	45,5 %
	smash	11,0 %		smash	10,6 %
	swip/ attack clear	23,6 %		swip/ attack clear	30,9 %
left forecourt	clear	32,2 %	11,7 %	clear	34,2 %
	drive	3,8 %		drive	2,5 %
	drop	33,0 %		drop	38,2 %
	smash	4,5 %		smash	5,0 %
	swip	26,5 %		swip	20,2 %
right forecourt	clear	32,0 %	11,8 %	clear	29,2 %
	drive	3,4 %		drive	1,8 %
	drop	34,5 %		drop	44,9 %
	smash	5,1 %		smash	7,2 %
	swip	25,0 %		swip	17,0 %

It is remarkable that the Austrian top players answer 30,3 % of the strokes in the left rearcourt with an attack clear. International top players use this pattern only in 14,4 % of their strokes. They hit 37,7 % of the strokes with the smash. In the right rearcourt the Austrians hit 33,5 % of the balls with the drop and the

internationals have 41 % smashes there. This shows the offensive play of the world class. The drop leads in the list of the most used strokes in every other court area.

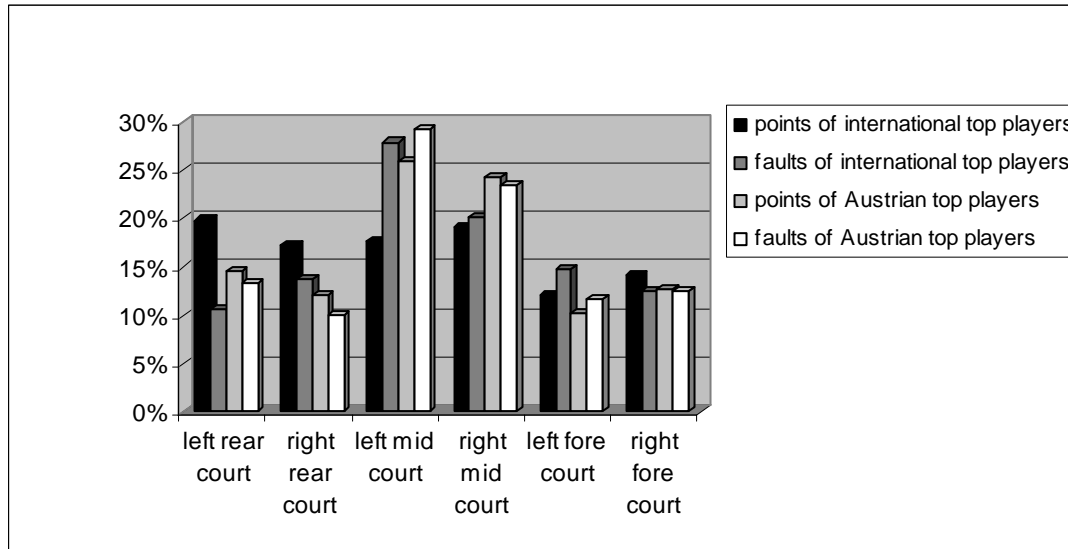


Figure 6. Points and faults in different court areas

Figure 6 focuses on the points and faults made in the different court areas. It shows that the international top players make most points at the left rear court whereas the Austrians score most points in the left midcourt. Most faults of the international top players and the Austrian top players occur in the left midcourt. However, these distributions are dependent on the frequencies of the strokes in the respective areas (Table 3).

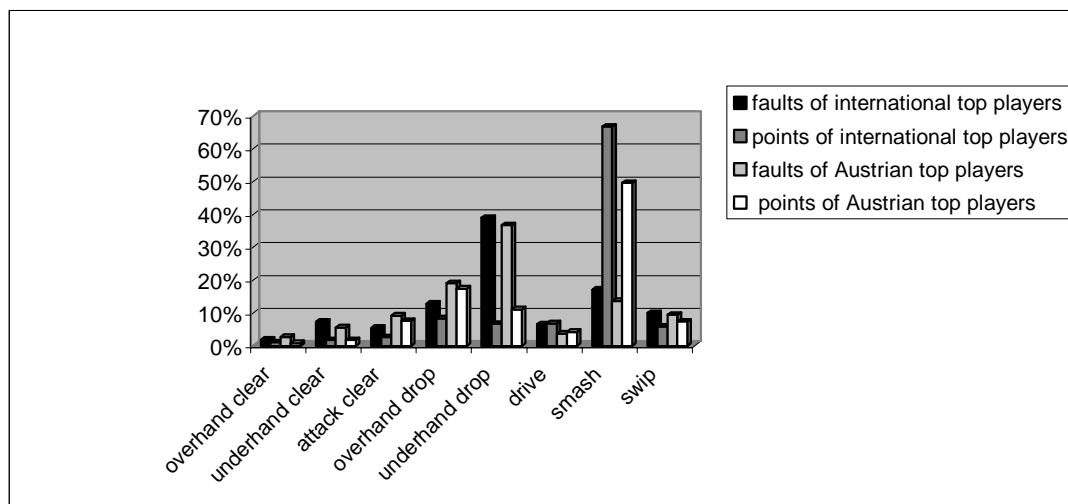


Figure 7. Faults and points with different strokes

A summary of the distributions of faults and points with the different kinds of stroke is given in Figure 7. Again, these distributions are dependent on the frequencies of strokes of the respective kind (Table 3).

Nearly 50 % of the Austrian points are hit with a smash. International top players make more than 60 % of their points with a smash. An explanation could be that the Austrians have a weaker smash. Most faults in both groups are made with the underhand drop.

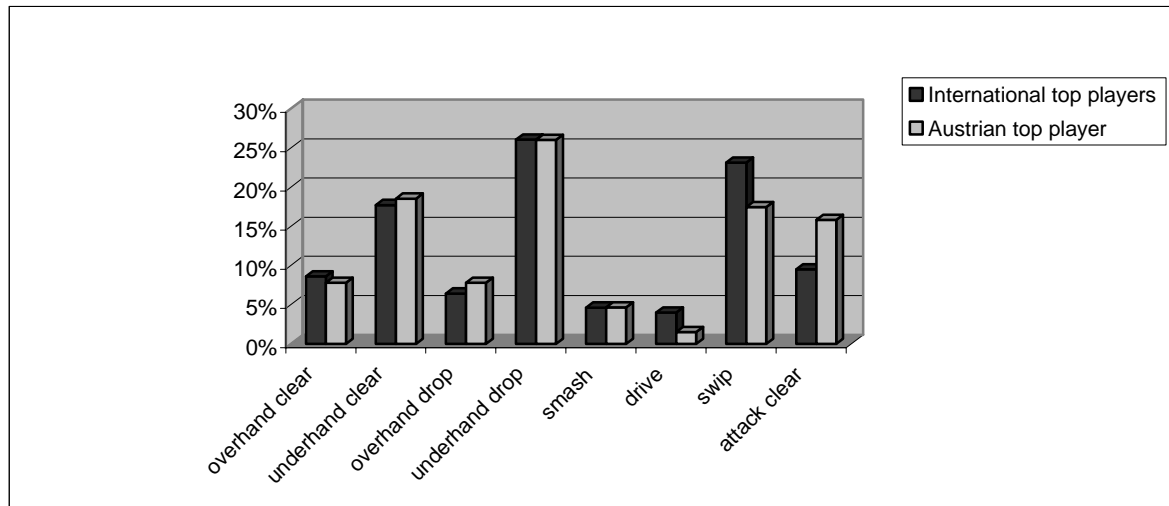


Figure 8. Distribution of different kinds of strokes before point

An interesting aspect is the frequency of the kinds of stroke before the point (Figure 8). The most frequent kind of stroke in both groups is an underhand drop. The most noticeable differences are in the use of drive, swip and attack clear before point.

4 Discussion

The main goal of the given investigation was to highlight the structural differences in the playing patterns between the world's top male players and the Austrian top male players in single badminton.

As a central point it could be shown that international games have more rallies and more strokes per game than the Austrians. The world class also performs more offensive strokes. Noticeable differences in making points respectively faults concerning aspects such as kind of stroke, height of stroke and area of stroke could be observed.

Because of the significant longer rallies in international top level badminton compared to the Austrian more importance should be attached to rally shots when coaching the Austrian athletes.

5 References

Bochow, W. (1989). *Badminton optimieren*. Ahrensburg bei Hamburg: Czwalina.

Hong, Y. & Tong, Y.M. (2000). "The playing pattern of the world's top single badminton players in competition – a notation analysis". *Journal of Human Movement Studies*, 38, 185-200.

Lames, M. (1990). *Leistungsdiagnostik durch Computersimulation*. Frankfurt am Main: Harri Deutsch.