How to measure achievement motivation?
An explorative study to measure achievement motivation in a selective Assessment Center

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Introduction
The selection of the right persons for a job is decisive for the success of a business, as it determines the working performance of the employees and to a large extent their job satisfaction, motivation and commitment. As a result, efforts are made, above all in English-speaking countries, to supplement the subjective impression from the job interview with standardised "objective" assessment procedures (Tangenberg, 2005). Special psychometric tests enjoy a great deal of popularity as they are simple and inexpensive to use. The major demand for such trait-oriented tests is matched by an enormous range of tests on offer and only rarely do personnel managers have the required psycho-diagnostic knowledge to be able to make a systematic selection of the appropriate instruments. Thus, general procedures are normally applied, which, although they provide an overall picture of the personality of a person (Big 5), are only of limited relevance to the specific requirements of the company or of the field of activity in question. This practice is highly questionable, especially as scientific findings indicate that only two of the Big 5 dimensions - conscientiousness and neuroticism – have general importance in relation to professions (Höft, 2005).

The situation is different in the case of complex diagnostic procedures such as the Assessment Center (AC). This work simulation is developed by specialists on a case by case basis in accordance with a precise job specification and thus focuses on the skills and abilities that are relevant to the job. Despite this professional approach to measure promising factors, and empirically proven predictive validity, the Assessment Center is still not without its critics. In contrast to personality tests, in which candidates are invited to evaluate their personalities in relation to a wide variety of professional and social experiences, this laboratory-like situation simply provides a relative short-term view of a person's behaviour in a simulated work situation.

Nowadays an increasing number of Assessment Center specialists argue that the impression of behaviour obtained from the simulation exercises should be supplemented with additional diagnostic procedures in order that the quality of the prediction be optimised (e.g. Kleinmann, 2003). Hossiep and Mühlehaus (2001) even claim that in combination with psychological tests and interviews, the accuracy of Assessment Centers could be raised from 40% to 60%. It is therefore hardly a coincidence that in the German-speaking region almost 16% of AC users have integrated personality tests into the overall process (Neubauer, 2001).

But even in the case of combined procedures the problem of the unsystematic use of personality tests arises. Collins, Schmidt, Sanchez-Ku, Thomas, McDaniel and Le (2003) as well as Scholz and Schuler (1993) investigated in their meta-analyses the extent to which general personality characteristics (Big 5) are truly connected to AC success and came to the sobering conclusion that the correlations were very limited in their extent. These results were also successfully replicated in various other studies (e.g. Annen & Kamer, 2003). Such a low degree of correlation is not surprising, as apart from the fact that the two instruments are not based on the same scales, various aspects (personality traits versus behavioural characteristics) are evaluated from different perspectives (self-assessment vs. other rating).
In the case of the combined use of trait- and simulation-oriented methods, it is also essential to remember that both approaches appraise the same job-relevant constructs (cf. Höft & Bolz, 2004). Under these conditions, trait-oriented tests can balance uncertainties in relation to the measurement and observation of certain requirement dimensions in the AC, can confirm certain behavioural observations, and in some cases can provide additional relevant information. In the present study we will investigate the usefulness of such combinations of methods by the practical example of the Assessment Center for professional officers.

Starting position and issues

The Assessment Center for professional officers (ACABO)
In Switzerland, in order to be able to pursue a career as professional officer, in addition to the general requirements (rank of officer with good military qualifications, high school leaving certificate or university degree, unblemished record, a pass in the sports test) the applicants must also pass a two-day Assessment Center. In relation to the exercises, the observation and assessment procedure as well as the requirement dimensions, the ACABO corresponds to a traditional group AC. The candidates go through six exercises (two presentation exercises, two role plays as well as two group exercises) that have a clear connection with the activities of a professional officer. They are assessed by various observers with regard to a total of seven dimensions (personal attitude, achievement motivation, analysis, social contact, oral communication, dealing with conflicts, influencing behaviour). In each exercise, two assessors observe the behaviour of the candidates and thereafter agree on an assessment based on a four point scale (clearly achieved - achieved - not achieved - clearly not achieved). The observer team is composed of superiors and chiefs of training who are recruited primarily from divisions which have sent candidates. Because the Swiss Militia Army can still be considered a part of society, civilian assessors – usually psychologists or human resources specialists – are also involved.

Difficulties in the assessment of achievement motivation
Clear behaviour-oriented assessment criteria such as oral communication, dealing with conflicts or influencing behaviour can normally be handled well by the observers. Uncertainties in relation to adequate perception and evaluation are recurrently seen in the case of the requirement of achievement motivation. Many assessors admit to having difficulty in evaluating general achievement motivation on the basis of exercises that are barely one hour long. In addition to this, that fact that behaviour is always a result of ability and motivation therefore makes it difficult to assess motivation as an isolated criterion.

Nevertheless the assessment of achievement motivation cannot be disregarded. Its general relevance becomes clear, for example, if one follows scientists such as Eckardt & Schuler (1992) who regard achievement motivation – next to cognitive skills – as the second, probably general, professionally relevant factor. This is also seen in the fact that, despite the aforementioned assessment difficulties, 58% of companies questioned by Neubauer (2001) state a factor similar to achievement motivation - commitment - as a requirement in their AC. And the study by Kilcullen, Mael, Goodwin and Zazanis (1999) even provides empirical evidence in the military context that motivation at work and achievement orientation have a significant correlation with job performance by members of the American Special Operation Forces.

Because achievement motivation is regarded as an essential factor for the success of a future career officer, but its measurement gives rise to various uncertainties, a multimethod
diagnostics might be useful in order to obtain a more comprehensive and more adequate picture. Such a method has already produced encouraging results in the ACABO. In order to give a broader base to the dimension analysis, specific cognitive performance tests have been integrated into the procedure. These then emerge as good predictors for the study success and accordingly contribute to improving the predictive validity of the ACABO (Annen & Gutknecht, 2002).

Based on these considerations, achievement motivation has since 2003 been tested in the ACABO with a further questionnaire instrument - the achievement motivation inventory (LMI) from Schuler & Prochaska (2001). In addition, each candidate carries out a self-assessment of his achievement motivation at the end of the assessment. This self-assessment is based on the same definition specification as is found in the observation sheets. This is in keeping with the requirement of Höft & Bolz (2004) that self-assessment and other rating should be carried out by an identical procedure.

**Question**
The present study would accordingly like to examine the extent to which the same construct of achievement motivation can be recorded with different instruments and how much insight the individual methods of assessment provide with regard to the success of the AC. Due to its as yet insufficient basis in literature, the construct validity of the LMI must also be determined first of all.

**Instruments for the measurement of achievement motivation**

*Assessment of achievement motivation in the AC by trained assessors*
Achievement motivation is assessed as one of seven requirement dimensions in the ACABO. The assessors make their evaluation on the basis of clearly defined behavioural characteristics, e.g. of how much willingness to perform, initiative, commitment, perseverance, persistence and stamina the candidates use to fulfil their tasks. Achievement motivation is observed in four exercises (two interview exercises and two role plays). After each exercise, two assessors agree on a joint assessment. The final grade is made up of these four assessments.

*Self-assessment of achievement motivation in the AC*
Following the ACABO, the participants receive the same precise description of the assessment criteria as listed on the assessors’ observation forms. They are then invited to assess their own performance in each of the seven criteria, also on a four point scale.

*The achievement motivation inventory*
With the achievement motivation inventory (LMI; Schuler and Prochaska, 2001), it is intended to record various components of performance in a job-related context. After numerous pilot tests, dimension analyses and the examination of various random tests, the final version of the questionnaire includes 17 facets with a total of 170 items. The achievement motivation inventory is so far the only scientifically established procedure that covers performance resp. achievement characteristics in this width and depth (Hossiep & Mühlhaus, 2005).
Results
The results are based on the data of those 132 applicants who underwent the ACABO in the period between September 2003 and June 2005. 130 were men (98.5 %). As the two women did not conspicuously differ from their male counterparts in their results in the Assessment Center as well as the LMI, they were also taken into account in the study.

Construct validity of the LMI in a selection situation
To date there have been very few studies on the construct validity of the LMI (Schuler & Prochaska, 2000; Byrne, Mueller-Hanson, Cardador, Thornton, Schuler, Fintrup & Fox, 2004). The current findings indicate that the 17 dimensions of the LMI lead to a 3-factor structure (Schuler & Prochaska, 2000), which consists of ambition (24.3%), independence (22.5%) and task-related motivation (16.2%). Byrne et al. (2004), on the basis of a cross-national study, come to the conclusion that this 3-factor structure can also be observed when translated into English (Achievement Motivation Inventory) and in different cultures (Germany, Israel, USA). Above all with a view to the practical use of the test as part of the Assessment Center, it is of course preferable to work in calculations with first order factors, rather than to take all 17 dimensions into account. As the available data – in contrast to that in the other studies – was deliberately obtained in a specific context (armed forces, selection situation), it does however make sense to examine the construct validity of the LMI again in detail on the basis of the available data material.

Schuler & Prochaska (2000) examined the factor structure with only a principal component analysis, whereas Byrne et al. (2004) also carried out a confirmatory factor analysis (CFA). As the CFA provides much more information on the goodness-of-fit, and both studies produced similar results, the following comparison of data concentrates primarily on the model used by Byrne et al. (2004).

In a first step, an examination is made of whether the Byrne model can also be reproduced using the available data material. The fit indices (GFI = .838; AGFI = .778; NFI = .779; TLI = .845; RMSEA = .087) of the replicated Byrne model show acceptable values. Nevertheless the question arises of whether a recalculated model would be able to achieve better values. For this reason, in a second step - analogous to the course of action of Byrne et al. (2004) - a further explorative factor analysis with subsequent varimaxrotation is carried out (cf. Tab.1).

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1 GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; NFI = normed fit index; TLI = Tucker-Lewis index; RMSEA = root-mean-square error of approximation;
Table 1: Varimax rotated factor matrix of the items in the achievement motivation inventory

<table>
<thead>
<tr>
<th>LMI-Scales</th>
<th>M</th>
<th>SD</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Self-determination &amp; goal</td>
<td>Competitive thinking</td>
<td>Activation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-control</td>
<td>50.23</td>
<td>8.05</td>
<td>.765</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexibility</td>
<td>53.30</td>
<td>6.26</td>
<td>.745</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internality</td>
<td>56.83</td>
<td>5.66</td>
<td>.743</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistence</td>
<td>52.41</td>
<td>5.21</td>
<td>.742</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preference for difficult</td>
<td>51.33</td>
<td>7.49</td>
<td>.741</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tasks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fearlessness</td>
<td>48.69</td>
<td>8.70</td>
<td>.720</td>
<td></td>
<td>.437</td>
</tr>
<tr>
<td>Confidence in success</td>
<td>51.80</td>
<td>6.01</td>
<td>.620</td>
<td></td>
<td>.510</td>
</tr>
<tr>
<td>Independence</td>
<td>51.45</td>
<td>6.14</td>
<td>.613</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eagerness to learn</td>
<td>51.23</td>
<td>6.93</td>
<td>.555</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal setting</td>
<td>50.87</td>
<td>6.71</td>
<td>.523</td>
<td></td>
<td>.439</td>
</tr>
<tr>
<td>Status orientation</td>
<td>47.05</td>
<td>7.69</td>
<td>.816</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitiveness</td>
<td>42.17</td>
<td>9.11</td>
<td>.742</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement/commitment</td>
<td>47.57</td>
<td>8.18</td>
<td>.574</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dominance</td>
<td>54.10</td>
<td>5.40</td>
<td>.500</td>
<td></td>
<td>.506</td>
</tr>
<tr>
<td>Flow</td>
<td>49.30</td>
<td>7.93</td>
<td></td>
<td></td>
<td>.766</td>
</tr>
<tr>
<td>Compensatory effort</td>
<td>49.18</td>
<td>7.54</td>
<td></td>
<td></td>
<td>.673</td>
</tr>
<tr>
<td>Pride in productivity</td>
<td>56.42</td>
<td>5.28</td>
<td></td>
<td></td>
<td>.425</td>
</tr>
</tbody>
</table>

Notes: N = 132; Loadings > .40 shown

The results of the principal component analysis with subsequent varimax rotation support the findings made so far on the 3 main factors. The factors clarify together 58.3% of the total variance. Of this, 29.8% falls to the first, 16% to the second and 12.5% to the third factor. Based on these results, a new confirmatory factor model is then calculated. This new model shows slightly better fit indices in comparison with the Byrne model (GFI = .868; AGFI = .820; NFI = .829; TLI = .915; RMSEA = .065). In the measurement model (Fig.1), the insignificant link between factor 2 and pride in productivity is left aside due to the insignificantly better fit index and for the sake of simplicity. The reproduced matrix clarifies 86.8% of the observed variance in the covariance matrix.
Interim result

Although the present data may be described in terms of a 3-factor solution, just as in the case of Schuler & Prochaska (2000) and Byrne et al. (2004), here the factors are differently composed. The factor self-determination and goal setting relates to how self-determined and self-confident a person is and how high they set their goals (e.g. self-control, internality, independence, confidence in success, fearlessness, goal setting, prefer difficult tasks, eagerness to learn). The factor competitive thinking includes scales which primarily involve measuring oneself against others (e.g. status orientation, competitiveness, dominance) and the factor activation may be represented by scales that relate to the stress or vitality experienced by a person when carrying out a task (e.g. compensatory effort, flow, pride in productivity). This differing data structure could on the one hand be due to the sample, as here a relatively small, homogeneous group made up almost exclusively of men of similar age was tested in a specific context. On the other hand, the setting might also play a role, especially as the persons completed the questionnaire in a selection situation and their scale means are higher than those of the samples by Byrne et al. (2004). In addition, it cannot be excluded that in the case of self-descriptions in the selection process, social acceptability played a major role. What can be said, however, is that it was possible to identify three factors that provide good statistical values and which are tailored in their content towards professional officers. Accordingly, these factors can be used both for more extensive evaluation and be considered for application in practice.

Notes: All standardised path coefficients are significantly at the .05 level.
Connection between the individual assessment procedures for achievement motivation

In a next step, it is now examined to what extent the individual assessment procedures for achievement motivation measure the same construct and which assessment procedure is best suited for the prediction of the Assessment Center result. To do this, the first step is to calculate the correlations between the individual measurement instruments. (cf. Table 2).

Table 2: Connection between the individual assessment procedures for achievement motivation

<table>
<thead>
<tr>
<th>Achievement motivation inventory</th>
<th>Achiever assessment in the AC</th>
<th>Assessors’ evaluation</th>
<th>Self-assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-determination &amp; goal setting</td>
<td>-.001</td>
<td>.268**</td>
<td></td>
</tr>
<tr>
<td>Competitive thinking</td>
<td>-.073</td>
<td>.203*</td>
<td></td>
</tr>
<tr>
<td>Activation</td>
<td>-.037</td>
<td>.184*</td>
<td></td>
</tr>
<tr>
<td>Overall LMI result</td>
<td>-.015</td>
<td>.236**</td>
<td></td>
</tr>
</tbody>
</table>

Achievement motivation in the AC
Assessors’ evaluation .125

Note: N = 132

It is interesting to note that significant correlations are limited to data from the candidates' self-evaluation (LMI or self-assessment in the AC). Although the LMI is far more comprehensive and records various facets of achievement motivation, all three factors as well as the overall value correlate with the apparently generally conducted self-assessment of motivation behaviour in the Assessment Center. On the other hand, achievement motivation as evaluated by the assessors neither corresponds with the self-assessment of the AC performance nor with the individual LMI factors.

Connection between the individual assessment procedures and the AC results

The appraisal of the AC dimension of achievement motivation naturally is confounded with the AC overall result. The ACABO dimensions also – in contrast to the exercises – show no discriminant validity (Annen, 1995). For this reason, only the links between the two self-assessment instruments and the performance in the exercises as well in the overall AC are examined in order to ascertain whether these two instruments can make an additional contribution to predicting AC success.

Table 3 now shows, however, that neither the self-assessment of achievement motivation in the AC nor the LMI are significant predictors of performance in the AC. A slight connection can be observed only between Factor 2 competitive thinking and the overall AC result (r = .177*). Detailed analysis indicates that the connection between this global factor and the AC-result can be attributed to a single scale – competitiveness (r = .245**). This significance of competitiveness for AC success appears perfectly plausible, as this is a competitive situation and competitiveness is most easily expressed in active and extrovert behaviour. This in turn can be observed by others and is for the most part assessed positively, especially in group discussions.
Table 3: Connection between the LMI and the self-assessment of achievement motivation and the AC results

<table>
<thead>
<tr>
<th>Achievement motivation inventory</th>
<th>Presentations AC Results</th>
<th>Role plays</th>
<th>Group exercises</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-determination &amp; goal setting</td>
<td>.061</td>
<td>-.037</td>
<td>.071</td>
<td>.032</td>
</tr>
<tr>
<td>Competitive thinking</td>
<td>.085</td>
<td>.149</td>
<td>.168</td>
<td>.177*</td>
</tr>
<tr>
<td>Activation</td>
<td>.012</td>
<td>-.010</td>
<td>.140</td>
<td>.051</td>
</tr>
<tr>
<td>Overall LMI-result</td>
<td>.066</td>
<td>.043</td>
<td>.037</td>
<td>.100</td>
</tr>
<tr>
<td>Achievement motivation in the AC (Self-assessment)</td>
<td>.131</td>
<td>.037</td>
<td>.014</td>
<td>.060</td>
</tr>
</tbody>
</table>

*Note: N = 132

With regard to the assessment and decision-making process in the AC, the question also arises of whether people with unusual LMI profiles also behave conspicuously in the Assessment Center. A profile comparison was however unable to confirm this hypothesis.

**Conclusion**

The LMI has the aim of making a general assessment of behavioural and attitude tendencies and is based with its 17 scales with a total of 170 items on very comprehensive and differentiating foundations. In contrast, the self-assessment of achievement motivation in the ACABO relates to the specific situation in the individual exercises. Despite differences in definition and the degree of differentiation, the correlations indicate that with both instruments something similar is being measured.

Although they have in part the same basis as regards content, none of the self-assessments, in contrast to the study by Schuler & Prochaska (2000), (whether global self-assessment of the achievement motivation shown in the AC or the LMI) correlate with the assessors' evaluation (other rating) of achievement motivation. This could be explained by the general difficulty of comparing one's own image of oneself with the image perceived by another. Various empirical studies confirm the lack of correlation between self- and other-ratings of performance at work (e.g. Atwater, Ostroff, Yammarino & Fleenor, 1998; Fleenor, McCauley & Brutus, 1996; Harris & Schrauboeck, 1988; Mabe & West, 1982). In addition, it is doubtful if the assessors can evaluate the achievement motivation of a person based only on their outward behaviour. This behaviour, as already mentioned, is not only determined by the level of motivation, but also by the circumstances of the situation or the skills and abilities of the person involved; i.e. if a participant in a certain exercise shows a paradoxical deterioration in performance because success depends on being particularly good ("choking under pressure"; Baumeister, 1984), the observer could well interpret that as a lack of motivation, for example. Eventually, we have to be aware that the assessors' evaluation in the AC - as opposed to the self-assessment - is made up of several persons' impressions.

The lack of correlation between the self-assessments and the AC results might therefore be attributed to a large extent to the differing modes of perception (self- versus other-rating). Content, however, seems to be less important because, despite identical contents, there is no relation between the assessment of achievement motivation conducted by assessors on one side, and ACABO participants on the other side. Moreover, the selection setting has the effect
of amplifying this. The participants tend in their self-assessment to overrate themselves (this case applies to 55.8% of the ACABO candidates!) and also tend to give the answers that seem socially desirable.

Overall the aim of obtaining a clear picture of the achievement motivation of a person with the aid of a multimethod measure proves, as would be expected, to be a difficult undertaking. The LMI contributes nothing to the explanation of the overall results of the AC, and the available data do little to clarify the content of the relevant assessment dimension. The question of what additional predictive value these instruments have with regard to success in a job remains unanswered.

Outlook
In relation to those candidates who worked on the LMI as part of the ACABO, there is still no data on their study or job success. In view of the results obtained by Schuler and Prochaska (2000), which postulate predictive validity for the LMI with regard to academic and professional success, if not for the AC result itself, this aspect must be examined in a further phase.

The 3-factor model worked out for the specific candidate group could permit the creation of an important requirement, in particular for any practical application, as the original 17 scales of the LMI would not be manageable as part of the ACABO assessment matrix, i.e. in the event that a statistical correlation with study or job success actually emerged, one would be almost immediately ready to integrate this instrument effectively in the assessment process.

The results of this study again clearly show that self-assessments can be nothing more than the basis for discussion with regard to any selection decisions. Although the ACABO is a selection instrument, the candidates also receive a detailed feedback report that is disclosed to them in a personal interview. Here the self-assessments made as part of the ACABO make an important contribution and help the person giving the feedback to supplement his observations with systematically recorded self-assessments from the participant. Accordingly these instruments will also be used in future and their content validity will be regularly evaluated.

Bibliography


