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Identifying achievement-motive-types with CFA: Interpreting the test battery ‚Work Style' as a new instrument in assessing the achievement motive

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Summary

Attempts to replace the story-based TAT measures for assessing hope for success and fear of failure by questionnaire-based measures failed, but recent attempts to integrate the advantages of both in a new technique (e.g. Multi-Motive-Grid) succeeded. As the possibility of using objective tests according to Cattell has not yet been adopted in the research of achievement motive, this study introduces the objective test 'Work Style' a short computer-administered test battery measuring variables of achievement motive based on the paradigm of aspiration level. Achievement goals are assumed to be set by internal standards (mastery goals), but as the performance undergoes a social comparison the subject is tempted to switch to a performance goal. Subjects are classified in three groups: the 'hope of success', the 'fear of failure' and the 'avoid failure' groups, being identified as types by means of CFA. Comparing CFA-types derived from samples taking the test in different motivational settings, it is discussed whether situational motivation is assessed or the underlying achievement motivation. Comparing the types with respect to different tests assessing intelligence and scores of personality questionnaire NEO-FFI, shows that there are differences concerning the score of the Complex Rule Recognition test, the Matrices, a Mathematical Task, Openness for Experience and Conscientiousness.

Key words: Configural Frequency Analysis (CFA), achievement motive, assessment, objective test, aspirationlevel

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1. Introduction

Assessment of achievement motive has a long tradition in psychological research. The story-based measures of TAT had been the standard for assessing hope for success and fear of failure. Later, there were attempts to replace the TAT by questionnaires, but the questionnaire-based measures turned out not to be comparable. Over the years many attempts have been made to develop questionnaire measures of achievement, but none of them have proved to be consistently related to the story-based motive measures. According to McClelland (1989) this is due to a partition of need achievement. One part, the self-attributed need achievement, represents the deliberate opinion of a person concerning achievement and can be assessed with questionnaire-type measures. The other part, the implicit need achievement, is unconscious and therefore only accessible with story-based measures.

Quite interesting results showed the factor analysis of Big-Five personality variables together with story-based and questionnaire-based measures of the achievement motive made by Prochaska (1998). Questionnaire-based achievement motive measures, like 'Striving for Success' (MAS, Mehrabian Achievement Risk Preference Scale, Mehrabian, 1968 - German translation from Mikula et al., 1976), 'Striving for High Performance' and 'Endurance' (LMT, Hermans et al., 1978) became localized together with 'Conscientiousness', 'Extraversion' and 'Neuroticism' (negative loading) build a factor with 'Negative Test Anxiety' (LMT). 'Openness for Experience' loads together with 'Positive Test Anxiety' (LMT) and 'Striving for Success' (MAS). The story-based measures (TAT, Heckhausen, 1963 and a new video-type TAT, Prochaska, Schuler and Radziwinski, 1993) form their own factor, except the measure 'Fear of Failure' (TAT) which loads together with 'Agreeableness'.

The difference between the deliberate and the unconscious part of achievement motive is important not only for classifying measures. It is also important to classify the behaviour. In a short-term view, respondent behaviour can be analyzed: It is said to be provoked by characteristics of the situation – like social comparison, positive consequences, expectations etc. – or by characteristics of the task itself, e.g. difficulty. It is predictable with questionnaire-type measures. Analyzing operant behaviour – everything needing long-term planing or consequent pursuing of action – one cannot say how it has been provoked. Influence of a single situation or of single tasks is insignificant. The connecting constant is only the implicit need achievement of a person. This kind of behaviour is best predicted by story-based measures. Being precise, the terms respondent and operant behaviour can easily be replaced by the terms 'motivation' and 'motive'. Motivation is defined as an interaction of motive and situation. The motive itself serves as a description for behaviour across different situations and cannot be observed. The story-based measures are actually working with different situations, aggregate a wide range of aspects (like feelings, expectations and situational themes). The measure will therefore better reproduce the reality than questionnaires focussing on single and abstract aspects, having either a lot in common with conscientiousness or with anxiety. There is no argument about the fact that this might be a condition for success – but why not using a proper personality questionnaire for assessing conscientiousness and a proper measure for anxiety in achievement situations?

Although the achievement motive is used in a wide sphere of psychological research and practical work (e.g. educational psychology) there are only a few psychometric tests quoted to measure this important construct and hardly any of them are suitable or practical. It is worth mentioning the recent successful attempt to integrate the advantages concerning validity of story-based and advantages in administration of questionnaire-based measures in the MMG Multi-Motive-Grid (Schmalt, Sokolowski and Langens, 2000), assessing achievement motive as well as some other motives.

The possibility of using objective tests, according to Cattell, has not yet been adopted in the research of achievement motive. Thus, this study introduces the objective test 'Work Style'

(Kubinger and Ebenhoeh, 1996), a short test battery measuring variables of achievement, based on the paradigm of aspiration level. Achievement goals are assumed to be set by internal standards (mastery goals), but as the performance undergoes a social comparison the subject is tempted to switch to a performance goal. Thus the test stimulates the achievement motive resulting in situational achievement motivation – being evident through observable behaviour. As the setting of aspiration level is observed more than one time it should be possible to generalize the results as achievement motive.

The first step of this study is to classify subjects into groups by 'Work Style' measures derived for this study ('aspiration-level in an easy performance task'; 'change of aspiration level due to social influence' – experiencing failure in social comparison) and try to identify some of the groups as types by means of CFA (von Eye, 1990). By comparing CFA-types derived from samples taking the test in different motivational settings, it is discussed whether situational motivation is assessed or if it is possible to draw conclusions about the underlying achievement motivation.

To allow interpretation in the context of personality theory and to connect this new measure of fear of failure, the relation between this new score and variables of the Big-Five model are presented.

Additionally, preliminary attempts to validate the measures of the test using primarily objective indicators, such as results in intelligence tests, or other tests assessing cognitive factors, are made. Subjects sticking to 'hope for success' are supposed to consider their ability as high, and therefore supposed to score better than individuals driven by 'fear of failure'.

2. Materials and Method

2.1 Test battery 'Work Style'

'Work Style' is a short computer administered test battery influenced by the work of Cattell's Objective Analytic Personality Test Battery (O-A) (Cattell, 1955; Cattell and Warburton, 1967). Beyond the variables 'Aspiration Level' and 'Tolerance for Frustration', which are connected with the achievement motive, one can assess 'Reflectiveness/Impulsiveness' and 'Endurance on boring work'. The assessment is not based on questionnaires but on tests encouraging subjects to do their best.

As subtest 2 is the centre of interest for this study, the task is explained and discussed in more detail. After experiencing their competence in coding symbols in the first trial of subtest 2 (see figure 1), individuals are informed about the number of 'correct' coded symbols they made. They are then asked to forecast the number of 'correct' they will make in the next trial. The difference between 'forecast after trial 1' and 'correct coded symbols in trial 2' is set in relation to the 'number of correct coded symbols in trial 2' to form the first measure for the aspiration level in order to eliminate effects of the absolute level of performance.

Four similar trials follow. After these the individuals are not only informed of the results obtained, but also informed about the results other people usually reach in the respective trials. From this, individuals have to experience the fact that the 'others' always did slightly better than they did.

The difference between 'forecast after trial 4' (after social comparison) and 'correct coded symbols in trial 5' is set in relation to the 'number of correct coded symbols in trial 5' to form the second measure for the aspiration level. The task is presented in figure 2.

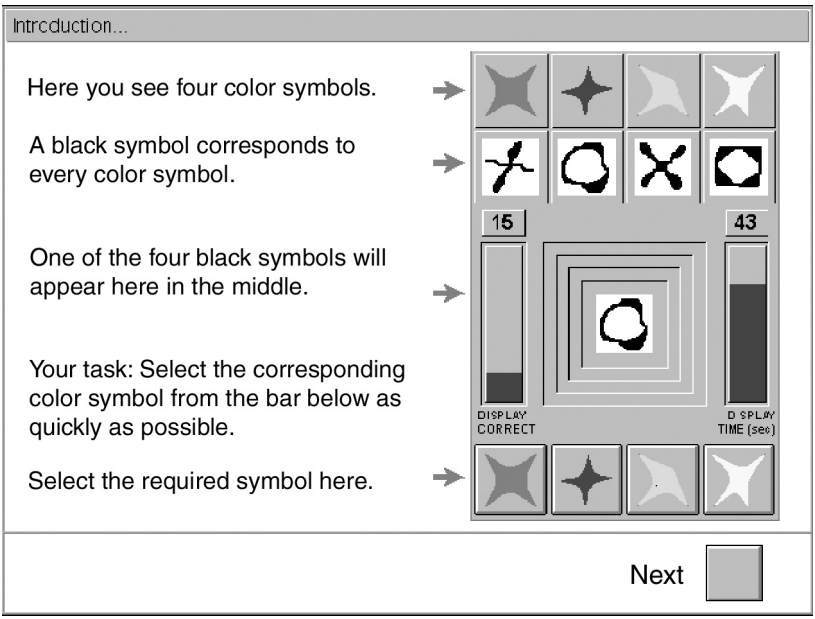

Fig.1:
Part of the introduction to subtest 2

Trial 1 (see Fig)	→	Information about number of 'correct' in trial 1	→	individuals forecast about number of correct in trial 2
Trial 2	→	Information about number of 'correct' in trial 2 and Information about other peoples' (slightly better!) results in trial 2	→	individuals forecast about number of correct in trial 3
....	→	...	→	...
Trial 5	→	End of subtest 2		

Fig. 2:
The course of subtest 2 in diagram form. Measures formed out of subtest 2: 'aspiration level 1 (start of test)' = ('forecast after trial 1' – 'correct symbols in trial 2') / 'correct symbols in trial 2'; 'aspiration level 2 (end of test)' = ('forecast after trial 4' – 'correct symbols in trial 5') / 'correct symbols in trial 5'.

The central concept of this task and the derived measures is the goal setting concept and the concept of self-assessment of abilities. Mabe and West (1982), who meta-analyzed a number of studies investigating self-assessment in a wide variety of fields, report a tendency to overestimate one's performance, especially if there are only few conditions for realistic self-assessment realized. Considering the sort of self-assessment realized by the task in subtest 2, one can say that it fulfills most of the criteria to make realistic self-assessment possible.

Unrealistic performance-forecasts are therefore due to individual facts like achievement motivation and not primarily due to situational facts like unsuitable tasks or lack of task-specific knowledge. The attention should not be drawn away from the fact that there are of course some situational factors relevant. For example, the situation can be more or less stimulating to achieve good results. The motivation to gain good results is presumably higher in a personnel-selection situation than in a research context.

2.2 Samples

Two samples were available for the cross-classification and identification of types by means of CFA:

The first analysis was made with an aggregated sample (sample 1a – 'selection sample') of young people (n = 408; age: 17-32, mean: 29.6) taking the test as an application for a different kind of training. One part of the sample took part in the selection and assessment for training as air traffic control staff (AustroControl; Vienna, Austria), taking the test battery 'Work Style' as a part of the multi-level assessment. The data has been kindly placed at this study's disposal by Hoffmann and Schrott (in prep.) who are evaluating the air traffic control staff assessment and selection. The other part of this sample has been placed at this study's disposal by 'Deutsche Bundeswehr' (Deutsche Bundeswehr, 2000). People in this sample took the test 'Work Style' together with other tests. The desire to obtain good results is considered as high (internal and external factors) for this sample.

A second analysis has been conducted again on an aggregated sample (n = 757; age: 17-60, mean: 26.6; sample 1b-'research-sample') which volunteered for a research project (University of Vienna, Austria) as a part of their training (students, studying psychology) or just for interest. Their results led to no consequences and are kept anonymous. The desire to obtain good results is therefore only driven by internal factors.

To conduct special analysis, subsamples of young people have been taken at random out of sample 1a (n = 92; 24 female, 68 male, age: 18-28, mean: 20.3) and sample 1b (n = 92, 16 male, 76 female, mean = 22.58). The idea was to match at least the age structure of both samples.

For analysis in connection with the validation of types, three samples were available who took the test 'Work Style' among some other tests; but worked under different motivational settings, like the first two samples. Sample 2a) contains 1075 young subjects applying for special training (and study at university) at 'Deutsche Bundeswehr' (age 20-33, mean = 24.8); (Deutsche Bundeswehr, 2000).

Sample 2b) contains 465 people (age 18-62, mean = 26.96), mainly students, volunteering in the same or a similar research project as the subjects of sample 1b). Sample 2c) contains 239 subjects (age 19-51, mean = 27.91) taking part in a research project concerning the comparison of questionnaires and objective personality tests (Kubinger, Hofmann and Litzenberger, 2002). As individuals of sample 2a) took all the tests as part of a selection, they are supposed to be more eager to gain good results than the individuals of samples 2b) and 2c). All individuals took the test 'Work Style'. The individuals of sample 2a) additionally took a test containing matrices, verbal analogies and mathematical items. Some of the individuals of sample 2b) took the rule recognition test, and the test concerning calculating with symbols. For a description of these tasks see fig. 3. Sample 2c) additionally completed the questionnaire NEO-FFI (NEO-Fünf-Faktoren-Inventar; Borkenau and Ostendorf, 1993).

META – 'Complex Rule Recognition':
Items of META consist of 3 parts: The first part is the so called 'Start String' (e.g. 'ABC'). The second part is the transforming rules that one can use to transform the start String (e.g. A → AD; B → BE; C → CF; D → B; E → C; F → A. Each rule is applicable several times to all suitable parts of the String.
The third part of the item is six suggestions for emerged strings (e.g. ABBECA, ADBCC, ABBESC, ADBBL, ABCWF, ABCAD). The individual has to detect the three strings that can *not* be formed by application of the given rules. This sample item is taken out of the instructions and is therefore rather easy!

RIS - Calculating in Symbols:
For the following calculations, you should try to calculate by means of symbols instead of numbers. Each number is represented by a certain symbol. Each symbol corresponds to a one-digit number (0 to 9), two symbols together correspond to a two-digit number (10 to 99), etc. e.g.(λ - λ = σ). The individual has to find out which number is represented by a certain symbol (e.g. σ = **?**). This sample item is taken out of the instructions and is therefore rather easy!

Fig.3:
Description for the tasks META and RIS

3. Results

3.1 Classification according to "Work Style"

Based on the results of subtest 2 (measures for the aspiration level) subjects are cross-classified according to their 'Aspiration Level - measure 1' (realistic prediction, overestimation, underestimation) at the beginning of the test (internal standard, mastery goal) and the change of 'Aspiration Level' at the end of the test, after repeated negative social comparison (stick to aspiration level, raise aspiration level, lower aspiration level).

Tables 1 and 2 show the results of the Configural Frequency Analysis. Three of the nine cross-classified groups could be identified as a type, and three as an antitype, using Configural Frequency Analysis (von Eye, 1990, 1998).

The types identified by CFA are described as follows: Type 5: 'hope of success': Individuals belonging to this group start the test with a realistic 'level of aspiration' (realistic prediction) and although they have to find out that other people do better in the respective task, they stick to their realistic 'level of aspiration' concentrating on their performance. They seem to be more eager to hit their own mastery standards, and do not let themselves be put under pressure by the normative (performance) standard. Type 3: 'fear of failure': These individuals start the test with an unrealistically high 'level of aspiration'. They overestimate their performance. The negative social comparison causes a relevant lowering, but the 'level of aspiration' remains unrealistic (either still overestimated or underestimated). Type 7: 'avoid failure': One can call these individuals cautious. They start by underestimating their performance (unrealistically low 'level of aspiration') but raise the level after gaining information about the others. Some of them finish with quite realistic predictions but others tend to overestimate their performance after the social comparison. They are cautious under the mastery goal standard, where they can avoid a failure by keeping their goals low, but

they make a special effort, once the goal standard changes: under a normative standard, being cautious is a non-effective strategy for avoiding failure.

Table 1:
Configural frequencies for the variables M1 'aspiration level 1 (test start)' and M2 = 'Change of aspiration level after social comparison' sample 1a) – 'selection sample'

Nr	Configuration	f(o)	f(e)	statistic	p	
1	11	2	14.534	-6.077	.00000000	Antitype
2	12	3	4.655	-.892	.18623655	
3	13	16	1.810	11.315	.00000000	Type
4	21	50	71.980	-5.407	.00000000	Antitype
5	22	45	23.054	6.000	.00000000	Type
6	23	9	8.966	.014	.49443443	
7	31	229	194.485	.029	.00000000	Type
8	32	42	62.291	-5.245	.00000000	Antitype
9	33	10	24.224	-5.442	.00000000	Antitype
		n = 406				

Notes: Lehmachers test was used; Bonferroni-adjusted alpha = .0055556; a CFA of order 1 was performed Chi2 for CFA model = 171.3079; df = 4; p = .00000000; LR-Chi2 for CFA model = 107.0045; df = 4; p = .00000000.

Table 2:
Configural frequencies for the variables M1 'aspiration level 1 (test start)' and M2 = 'Change of aspiration level after social comparison' sample 1b) – 'research sample'

Nr	Configuration	f(o)	f(e)	statistic	p	
1	11	4	25.637	-7.492	.00000000	Antitype
2	12	11	10.255	.278	.39046535	
3	13	24	3.108	12.679	.00000000	Type
4	21	75	121.614	-8.309	.00000000	Antitype
5	22	94	48.645	8.715	.00000000	Type
6	23	16	14.741	.393	.34705204	
7	31	416	347.749	11.456	.00000000	Type
8	32	93	139.100	-8.342	.00000000	Antitype
9	33	20	42.151	-6.516	.00000000	Antitype
		n = 753				

Notes: Lehmachers test was used; Bonferroni-adjusted alpha = .0055556; a CFA of order 1 was performed; Chi2 for CFA model = 259.3519; df = 4; p = .00000001; LR-Chi2 for CFA model = 183.1588; df = 4; p = .00000408.

Table 3: Descriptive statistics – ‘number of correct coded symbols’ and ‘forecast’

	sample 1b (‘research’) R					sample 1a (‘selection’) S					
	Number of correct coded symbols in trial					number of correct coded symbols in trial					
	1	2	3	4	5	1	2	3	4	5	
Mean	35.98	46.34	50.86	52.83	54.23	36.22	49.79	56.43	59	60.09	mean
Median	36.00	47.00	52.00	54.50	54.50	38.50	52	58	60.50	61	median
min-max	0-65	2-73	24-68	14-71	8-74	1-63	2-75	14-83	14-85	17-82	min-max
Percentile 10	25	30	37	40	41	18	34	40	44	47	percentile 10
25 / 75	30 / 43	41 / 54	45 / 57	47 / 59	47 / 62	29 / 45	46 / 57	51 / 63	53 / 65	55 / 67	25 / 75
Difference a)	Differenz der Mittelwerte: (S) - (F) =					+0.24	+3.45	+5.57	+6.17	+5.86	

	sample 1b (‘research’) Rp					sample 1a (‘selection’) Sp					
	forecast after trial					forecast after trial					
	1	2	3	4	5	1	2	3	4	5	
mean	38.35	48.13	57.10	54.04	53.62	42.04	56.43	62.26	64.35	63.89	mean
median	40.00	50.00	55.00	56.50	55.50	45	60	65	65	65	median
min-max	5-75	5-88	1-543	1-84	4-75	5-75	10-90	10-100	10-95	15-90	min-max
percentile 10	30	30	34	39	39	21	35	45	50	46	percentile 10
25 / 75	33 / 45	43 / 55	47 / 60	49 / 62	49 / 65	34 / 50	50 / 65	55 / 70	60 / 70	60 / 70	25 / 75
	mean difference: $(Rp_i) - (R_i)$ =					mean difference: $(Sp_i) - (S_i)$ =					
The forecast after trial x exceeds the performance by ...											
Difference b)	+2.37	+1.79	+6.24	+1.21	-0.61	+5.82	+12.64	+5.83	+5.35	+3.8	
	mean difference: $(Fp_i) - (F_{i+1})$ =					mean difference: $(Sp_i) - (S_{i+1})$ =					
The difference between forecast and the following performance is:											
Difference c)	-7.99	-2.73	4.27	-0.19		-7.69	0	3.26	4.26		

Quite interesting is the fact that these types could be identified in samples who worked under different motivational settings. One sample consists of young people taking part in an assessment for education as aviation personnel and other training, so one can consider them as motivated to gain very good results in the tests. The subjects of the other sample volunteered in research projects. As their results had no real consequences one can consider them as more 'relaxed' and not motivated by external conditions. This indicates not only that this task activates the achievement motive and does not only reproduce the motivation of a special situation, but also that the derived measures are suitable to report the activated motive. This does not indicate that there are no motivational differences between the two samples.

On the level of absolute results, e.g. 'number of correct per trial', gained on the special subsamples sample 1a) 92 and 1b) 92, there are indeed some differences indicating that in the selection situation motivation to gain good results is higher than in the research situation. Although the samples are quite similar concerning age and the individuals are assumed in principal to be equally skilful in handling the mouse to work through the test (even if this fact is not systematically controlled in this study), sample 1a92) make an average of up to 6 more correct symbols (see table 3, difference 'a'). From the second trial onwards the mean differences (t-test, homogenous variances) are significant or almost significant (alpha = 0.05; p2 = 0.061; p3 = 0.002; p4 = 0.000; p5 = 0.000). The appropriate multivariate test is significant too (Wilk's Lambda; p = 0.000). Also remarkable is that individuals of sample 1a)92 make more 'optimistic' forecasts than individuals of sample 1b)92. Their forecast is up to 10 symbols higher (see table 3, difference 'b'). The univariate mean differences (t-test, homogenous variances) are significant for forecast after trial, trial 2, trial 4 and trial 5 (p1 = 0.000; p2 = 0.000; p3 = 0.939; p4 = 0.001 p5 = 0.001); the appropriate multivariate test is significant (Wilk's Lambda; p = 0.000).

At the same time it is observed that the difference between the forecast and the following performance results leads to negative results for sample 1b, meaning that this group exceeded their forecast. On the contrary, this difference is usually positive for sample 1a, meaning that this group does not always reach it's prediction (see table 3, difference 'c'). The univariate test results are as follows: p12 = 0.852; 0.041; 0.854; 0.003. The appropriate multivariate test is significant (Wilk's Lambda; p = 0.000).

Obviously the individuals of sample 1a)92 make more effort in order to obtain good results (indicator: more correct coded symbols) and want to seem more ambitious (optimistic forecast) than the individuals of sample 1b)92.

The individuals of the two samples are distributed quite similarly over the 3 types and the mixed type. More than 50% of each sample is classified as type 7 - avoid failure type. About 25% of each sample is classified as 'mixed type', about 10% belong to type 5 'hope for success', and about 4% stick to 'fear of failure' (see table 4).

Table 4:
overview of the distribution of individuals between the three types and the 'mixed types'

	Sample 1a)		Sample 1b)	
	n	%	n	%
Type 5 'hope for success'	12	13.04%	13	14.13%
Type 3 'fear of failure'	5	05.43%	3	03.26%
Type 7 'avoid failure'	55	59.78%	50	54.34%
Mixed types	20	21.73%	26	28.25%

3.2 First hints for validation of types

Additionally, preliminary attempts to validate the types found by means of CFA and the measures of the test using primarily objective indicators, like results in intelligence tests, or other tests assessing cognitive factors, are made.

Subjects sticking to 'hope for success' are supposed to consider their ability as high and are therefore supposed to score higher than individuals driven by 'fear of failure' or 'avoid failure'.

To allow interpretation in the context of personality theory, the relation between the types and variables of the Big-Five model are presented.

The comparison of samples 2a, 2b and 2c with samples 1a and 1b shows that the new samples are distributed quite similarly to the old samples. Again we observe more than 50% of each sample in type 7 – 'avoid failure', about 25% in the 'mixed type', about 10% belong to type 5 'hope for success' and about 4% stick to 'fear of failure' (see table 5).

Table 5:
Overview of the distribution of individuals between the three types and the 'mixed types'

	Sample 2a)		Sample 2b)		Sample 2c)	
	n	%	n	%	n	%
Type 5 'hope for success'	97	9.02%	64	13.8%	37	13.8%
Type 3 'fear of failure'	39	3.63%	17	3.7%	10	15.7%
Type 7 'avoid failure'	707	65.77%	245	52.77%	116	49.2%
Non-types	232	21.58%	139	29.9%	73	30.9%

These groups were compared with respect to different tests (Matrices, Verbal Tasks; Complex Rule Recognition; Mathematical Tasks) assessing aspects of intelligence.

Sample 2a):

The non-parametrical Kruskal-Wallis Test is used to test the hypothesis that the three types differ according to their scores in intelligence tests. (Additionally it is also tested whether the four groups – three types and the group 'mixed types' – differ according to the intelligence test scores.)

The difference in respect of the 'Matrices' score and the 'Mathematical Task' person parameter is significant. (Kruskal-Wallis Test: Chi2 = 14.035, df = 2, p = 0.001 / Chi2 = 15.671, df = 2, p = 0.009). The 'hope of success' group did best in the matrices (median = 0.71). The 'failure' groups did worse – with a median of 0.49 for type 7 and 0.08 for type 3. The 'mixed type' group is in the middle with a median of 0.36.

In the 'Mathematical Task', type 5 and type 7 did equally well (median = 0.11); type 3 did worse (median = -0.43). No significant difference can be found concerning the 'Verbal Task'. (Kruskal-Wallis Test: Chi2 = 4.371; df = 2, p = 0.112).

Sample 2b):

Again, the non-parametrical Kruskal-Wallis Test is used to test the hypothesis that the three types differ according to their Complex-Rule-Recognition score and calculating in symbols. (Additionally, it is also tested whether the four groups – three types and the non-type group – differ according to the intelligence test scores.)

With a Chi2 of 7.807 (df = 2; p = 0.020) the Kruskal-Wallis Test indicates a significant difference between the Mean Ranks of the three types concerning the Complex-Rule-Recognition score. For the variable time taken to finish the Complex Rule recognition Test

there is no significant difference indicated by the Kruskal-Wallis Test (Chi2 = 3.614; df = 2; p = 0.164). (The test including four groups obtained the same result.)

The 'hope of success' group did best (median = 2). Both 'failure' groups did worst – with a median of 0. The 'mixed type' group is in the middle with a median of 1. The Complex-Rule-Recognition task is supposed to be a very difficult task, which can only be solved by working hard and consequently sticking to the task.

The difference observed concerning 'Calculating in Symbols' is not identified as a significant difference (Kruskal-Wallis Chi2 = 0.176; df = 2; p = 0.916). The test including the group 'mixed types' came to the same result. Analyzing the task 'Calculating in Symbols' it has to be said that this task is a lot easier than the 'complex rule recognition test'.

Sample 2c):

The Kruskal-Wallis Test indicates a significant difference between the groups concerning the Conscientiousness score (Chi2 = 14.029; df = 3; p = 0.003) and the openness of Experience score (Chi2 = 7.586; df = 3; p = 0.055) of NEO-FFI. The 'hope of success' group shows the highest mean Rank in Conscientiousness; the 'avoid failure group' the lowest. The 'avoid failure' and 'fear of failure' groups appear to be less 'open for experience'; the non-type group tends to show the highest openness scores.

4. Discussion

The main objective of this study was to introduce the test 'Work Style' as a new computer administered test battery to assess some variables relevant for the achievement motive by means of objective tests rather than questionnaires or projective tests.

According to the measures of subtest 2, subjects were cross-classified in order to find so-called achievement motive types. Actually, three types could be found by means of CFA and could be interpreted with respect to the theory of the achievement motive. These types were labelled 'hope of success'-type, 'fear of failure'-type and 'avoid failure'-type. Encouraging is the fact that these types could not only be found within one sample, but within two samples differing in respect of the motivational setting of the tests. This should not indicate that the motivational setting had no effect at all. The situational effects can be shown at least at a group level. The absolute performance level (number of correct coded symbols) of a sample working under the condition 'test taken in a selection' is up to 6 symbols higher than the performance level of the research group. Also remarkable is that individuals of sample 1a) (n = 92) make the more 'optimistic' forecasts, but do not always reach their prediction (they miss it slightly), whereas individuals of sample 1b) (n = 92) make less optimistic forecast and tend to exceed their forecast slightly. Obviously, the individuals in sample 1a) (n = 92) make more effort in order to obtain good results (indicator: more correct coded symbols) and want to seem more ambitious (optimistic forecast) than the individuals of sample 1b) 92.

Quite positive are the first attempts to validate the types found by means of CFA. There is a tendency observable that the 'hope for success' group performs best in difficult intelligence tasks like the Matrices, Complex-Rule-Recognition test and a mathematical task. The 'fear of failure' type generally performs worse in these tasks; the 'avoid failure' type is sometimes equal with the 'hope for success' type (mathematical task). No difference is observable for the 'Verbal-Analogies' task or 'Calculating in Symbols'. The hypothesis that at least the verbal task is too easy is put forward. The 'hope of success' group shows the highest mean Rank in Conscientiousness, the 'avoid failure' group the lowest. The 'avoid failure' and 'fear or failure' groups appear to be less 'open for experience'; the non-type group tends to show the highest openness-scores.

The ‘hope of success’ group can be characterized as more capable in intelligence-test performance, and describe themselves as more conscious. The ‘fear of failure’ and the ‘avoid failure’ groups can be characterized as less capable in intelligence-test performance, and describe themselves as less open for experience. Taking the results of Prochaska (1998) into account, this finding might be interesting to solve the question of whether ‘Work Style’ measures are similar to the questionnaire-based measures, or more similar to story-based measures. He reported closeness of Conscientiousness and measures, like ‘striving for Success’, ‘striving for high performance’ and ‘endurance’ (all questionnaire based), but not with story-based ‘hope for success’ measures and closeness for ‘openness for Experience’; ‘positive test anxiety’ and ‘striving for Success’. This speaks in favour for a similarity of ‘Work Style’ measures with the traditional questionnaire-based measures, avoiding the disadvantages of questionnaires, such as obtaining socially desirable answers.

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