

On objectivity and validity of oral examinations in psychology – A replication

Carmen Hagemeister¹ & Karl Westhoff²

Abstract

A hierarchy of requirements applying to practising psychologists is the basis of a concept for oral examinations in psychological assessment. A study on the objectivity of oral examinations was replicated. We found very high correlations between the evaluations of examiner and assessor and high correlations between the examinees' self-evaluations after the exam. Examinees' self-evaluations before the examinations correlated at about 0.48 with the marks in the oral examination. The results concerning preparation do not uniformly show that preparation in a group and mutual examination lead to better marks compared to preparation alone.

Key words: oral examination, examination, objectivity

¹ Correspondence concerning this article should be addressed to: Carmen Hagemeister, PhD, Institute of Psychology II, Technische Universität Dresden, 01062 Dresden, Germany; email: carmen.hagemeister@tu-dresden.de

² Institute of Psychology II, Technische Universität Dresden, Germany

Oral examinations are taken in many fields. For decades they have been the subject of criticism (summarized e.g. by Birkel, 1984), one argument being that agreement between different boards of examinations, i.e. the objectivity of evaluation, is low. In psychology, different results have been found concerning the objectivity of oral examinations: Trimble (1934) and Preiser (1975) found that oral exams in psychology are relatively objective. Dienst and Armstrong (1988) found a moderate objectivity, while Engvik, Kvale, and Havik (1970) assessed the objectivity as non-satisfactory. Novy, Kopel, and Swank (1996) were the first to study the psychometric features of oral exams for licensing in psychology. All these studies taken together lead to the conclusion that oral exams in psychology are not, by nature, highly objective. A former study (Westhoff, Hagemeister, & Eckert, 2002) showed that a high degree of agreement between examiner and assessor and sufficient agreement with the examinee after the exam can be reached when explicit evaluation rules are used and the exam is sufficiently structured. Our aim in this study is to replicate these results with a larger data set and a second examiner. A further aim is to add considerations on the content validity of oral examinations and their respective results.

The general exam regulations for psychology (currently *Rahmenordnung*, 2002) give only a very rough and short description of the content of the subjects of psychology. The departments at the universities decide on the form and duration of the exam; the chair on its content. Irrespective of these decisions, students and potential employers have a right to demand that the exam is as objective as possible. As the content is not defined precisely, objectivity between examiners from different universities cannot be expected, but should be ensured within a chair in order to guarantee fairness for the students. Several prerequisites must be met to achieve this goal.

Exams should verify that a graduate has the knowledge and skills required for his or her profession. If a universe of learning tasks exists, it is useful to state an explicit rule according to which tasks are drawn from this universe. If this is the case, exams can be called content-valid, i.e. they test what was defined and offered as subject matter in the curriculum (cf. Klauer, 1987). In our case, the universe of learning tasks consists of the knowledge and skills to be acquired. Candidates can be said to have more knowledge the better they are able to reproduce the knowledge which was to be learnt and the better they are able to apply that knowledge. In order to keep exams independent of the performance of other examinees and consistent over semesters, criterion-referenced assessment is necessary. However, an operational definition for each mark is required. Our definition is the following. The basic necessity is knowledge of fundamental facts ("sufficient", 4), the next level is more detailed knowledge ("satisfactory", 3). In the exam this corresponds to the reproduction of the fundamental facts (4) and to extensive reproduction (3). If a psychologist is expected to solve problems, he or she must be able to choose between possible alternatives. This is only possible if he or she knows the similarities and differences between the alternatives ("good", 2). "Good" is awarded when independent processing is evident, i.e. when similarities and differences between theories, methods, procedures or approaches are described correctly. This knowledge can then be applied to a practical problem which additionally requires an analysis of the situation and the potential effects of the alternatives, including the cost-benefit relation ("very good",

1). These criteria were defined by the second author about 25 years ago and were used by all persons working in his group.

Examinations should be a content-valid representation of the universe of learning tasks. In order to make examinations transparent and fair, this universe should be known to the students so that they can use this information to prepare for the exam. Before the exam the students should be able to judge to what extent they have covered the different topics of this universe and how deep their knowledge is. This should allow them to predict their mark, admittedly with some uncertainty as they cannot predict whether the examiner will ask questions on a topic they are good at or on one they are not so good at. In our former study the correlation between students' self-assessment before the exam was $\rho = .23$ and $.33$, which may indicate that the students only have a very vague idea of how well they are prepared for the exam. Another less likely explanation for the low correlation is that the students are unwilling to put their honest self-assessment down on paper for some reason, e.g. superstition, but instead deviate from it in either direction. The students can only use the system to prepare themselves better for the exam if they know it – and this is the reason why this correlation is of practical importance. Accordingly, we inform them about the system in the first lecture in assessment, in the courses over the next two semesters, and in the consultation for the exam at the end of each semester. As we have intensified our efforts in this respect since the last study, we expect the correlation between students' self-assessment before the exam and the final mark to have improved since the former study.

If the students know the universe of learning tasks, they can compare this universe with their answers after the exam. After the exam, they know which questions were asked, which is something they did not know beforehand. Therefore they should then be able to tell their mark more precisely than before the exam. Assuming that the questions were clear and that the students were not particularly badly-informed or badly-prepared, this should even be possible if they were unable to provide the information in the exam. If the students can tell the mark they got, this shows that the exam was content-valid and the questions were clear. In our former study, the correlation between the students' self-assessment after the exam and the final mark was $\rho = .68$ and $.73$, which is satisfactory considering the fact that the students do not have many resources left for self-assessment during the exam, and all except excellent students might not always be sure whether their answer was right. We expect to be able to replicate this correlation as well.

Wass, Wakeford, Neighbour, and Van der Vleuten (2003) recommend that examinations should be structured. This is the case for our examinations, which consist of three parts, each covering one topic (see methods section). They recommend that exams should be administered by pairs of examiners. This is legally impossible in our department. In our group, the assessors do not examine but nevertheless play an important role. They give their judgement first, and they may and do criticise the examiner after the exam if the examiner did not stick to the rules he or she formulated beforehand. Reasons for criticism might be that the examiner proceeded to the next level although the examinee's answer was insufficient. In our former study, the correlation between the examiner's and the assessor's evaluation was $\rho = .90$ and $.94$. We expect to be able to replicate this result in a larger data set and for a second examiner.

Learning in a group leads to better results than learning alone (Springer, Stanne, & Donovan, 1999). A meta-analysis for undergraduates in science, mathematics, engineering and technology showed that the effect was even greater when achievement was measured with instructor-made exams or grades than with standard instruments. Good preparation means that one not only knows the facts but is also able to present them to the examiner in a correct, clear and – if one wants to achieve the levels “good” or “very good” – in a structured form. This is best practised by telling the facts to another person, who then provides feedback on whether the reproduction was correct and clear. The best available substitute for the examiner and assessor is a fellow student who is well-informed. This is usually the case when the other student is preparing for the same exam. In our former study, we found that students who had prepared with one or more other students got better marks than students who had prepared alone. We expect to be able to replicate this result. We assume that two processes contribute to the superiority of preparation in a group. Firstly, the students become aware that they do not know some of the facts – this happens when they attempt to reproduce the facts. This kind of reproduction does not necessarily require another student, but is more likely and easier in a group than when learning alone. Secondly, if they ask each other questions, they may discover gaps in their knowledge they had not noticed before. To make this possible, it is usually necessary to have another competent person asking the questions. In other words, we expect students to benefit from a learning partner or group, and more so if they (cross-)examine each other. The third reason is that in a mutual examination the students learn to express themselves in a more precise and structured way, which is also helpful preparation for an exam.

A test is considered as fair if persons belonging to different groups are not discriminated, e.g. based on their gender (Testkuratorium, 1986). As all psychology students have to pass the same approval procedure there is no reason to assume that men and women differ in their ability. For this reason they should not differ in their marks.

Methods

The marks

We awarded marks for the exams according to the above mentioned criteria. The marks on levels 4 and 3 assess knowledge; the marks on levels 2 and 1 skills. The mark 5, “failed”, is given if the student does not reproduce fundamental facts correctly. Students also fail an exam if they do not turn up and do not subsequently provide a doctor’s certificate, but these cases are excluded from this study. A failed exam must be repeated. Students are entitled to a “free shot” if they enrol for the exam within the normally-scheduled time frame to complete their diploma. If they fail in a free-shot exam, the exam does not count. If they pass the free-shot exam and are not satisfied with their mark, they can repeat the exam and the better mark counts, i.e. there is no risk of worsening their marks through repetition of the exam.

The exam consists of the three parts “Standardized methods/procedures”, “Partly standardized methods/procedures” and “Deciding in assessment”. Each part takes about ten minutes. The exam as a whole should last between 25 and 35 minutes. The final mark is the mean of the three marks for the parts, with one exception: if students fail one part they fail the exam as a whole. As far as we know such an explicit system is not usually used in oral examinations in psychology. For this reason we assume that generalisation from our results to any oral exam is not possible but is limited to oral examinations with explicit scoring systems.

The system of marks

During our study the marking system was changed at the Department of Psychology. Initially there were the five marks mentioned above. Then a more differentiated system was introduced: Marks still range between 1 (the best possible mark) and 5 (the worst possible mark, i.e. “failed”) but can now be increased or lowered by 0.3 by adding ‘+’ or ‘-’. The marks 0.7, 4.3 and 4.7 cannot be awarded.

The examination procedure

While the students were waiting for the exam in front of the room they could read a leaflet informing them about our study. They were asked to note down the mark which they expected to achieve according to their level of preparation on a slip of paper and to put it into our secretary’s letterbox. In order to provide a warming-up stage after welcoming the student into the exam room, the candidate is allowed to choose a starting topic (anything except a test or questionnaire), and the examiner starts by asking: “Tell me about [the starting topic]”. In each part, the exam starts at Level 4 (reproduction) and proceeds upwards until the student fails the level or makes incorrect statements about fundamental facts on Level 2 (this happens very rarely on Level 1) or until the ten minutes assigned for the current part of the exam is up. The assessor writes down the question and whether the question was answered correctly or not and whether the examiner gave any extra help. If the answer was wrong, he or she also notes down keywords of the incorrect answer. Usually the examiner and the assessor note down their respective marks for the three parts in such a way that the examinee and their counterpart cannot see. After the exam, and after being asked to evaluate his or her performance from the perspective of the assessor during the waiting time outside, the examinee leaves the room. In the room, the assessor is the first to express his or her evaluation, then it is the examiner’s turn. If the evaluations differ, examiner and assessor talk through the record and agree on the mark the student will receive. The final mark is noted down. The student is then invited back into the room and asked for his or her own evaluation. Subsequently we inform him or her about the mark and ask some questions about how (see different categories below) and how long he or she prepared for the exam. The duration of preparation was standardized to weeks with 40 working hours.

The examinees

At Dresden University of Technology, all students of psychology must take the exam in the subject “Psychological Assessment and Intervention” for their diploma. The first opportunity is after three and a half years. For this study, we used the data of all students who provided information for all questions asked. Very few refused to take part in the study; a few others who were very disappointed by their result (most of them failed the exam) were not able to participate in any kind of conversation afterwards.

The analyses were conducted and the results are reported for six subsets of the data. Potential influences can be expected from (1) the person of the examiners (who were the authors of this study), (2) whether the student was taking the exam for the first time or was repeating it for the first, second or third time, (3) the simple vs. differentiated marking system. Only those combinations with at least 30 observations are reported in detail. All combinations are shown in Table 1.

Table 1:
Combinations of examiner, marking system and number of exam

marking system	exam	Examiner 1			Examiner 2		
		number	males	free shots	number	males	free shots
simple	1 st	518	18%	75%	22		
	2 nd	122	21%	2%	2		
	3 rd	13					
	4 th	1					
differentiated	1 st	210	15%	81%	131	14%	79%
	2 nd	33	3%	3%	30	10%	0%
	3 rd	1			1		

Note. The numbers depict the number of examinations for this combination. For those combinations which are reported in the results section the percentage of men is reported and for the first and second examinations the percentage of free shots.

Examiners and assessors

Each exam was carried out by one of the two authors. About one third of the students could choose between the examiners. The other students took their exam when only Examiner 1 was entitled to examine. Examiner 2 had been an assessor for 15 years and had sat in on hundreds of exams administered by Examiner 1 before actively examining. The level of experience of the assessors varied from “first assessorship” to “several years of experience as an assessor”. Ten assessors (two of them male, nine working in the group of Examiner 1) took part in this study.

Results

Table 2 shows the distribution of marks for the exams in the simple and the differentiated marking system. The marks cover the possible range with mean values between 2.7 and 3.4 for the six subsets analysed.

Table 2:
Percentage of each mark, first (Q1), second (Q2), and third quartile (Q3) of the marks per marking system, examiner, and number of examination

marking system	exam- iner	exam n	mark												Q1	Q2	Q3
			1.0	1.3	1.7	2.0	2.3	2.7	3.0	3.3	3.7	4.0	5.0				
simple	1	1 st	518	12		25			33			15	16	2.0	3.0	4.0	
		2 nd	122	8		24			34			21	13	2.0	3.0	4.0	
differen- tiated	1	1 st	210	3	5	10	11	16	13	14	11	9	2	7	2.0	2.7	3.3
		2 nd	33	0	3	3	0	3	24	15	9	12	15	15	2.7	3.3	4.0
	2	1 st	131	2	10	15	16	15	10	12	8	3	2	7	1.7	2.3	3.0
		2 nd	30	0	3	13	20	20	10	20	7	0	0	7	2.0	2.3	3.0

Inter-rater reliability and content validity

Table 3 shows the correlations between the evaluations of examiner and assessor, and self-evaluation before and after the exam. For the six subsets, the inter-rater reliability varied from $\rho = .92$ to $.98$. The mark awarded correlated with the examiner's evaluation with $\rho = .94$ to $.99$ and with the assessor's evaluation with $\rho = .96$ to $.99$. The mark awarded correlated with the examinee's self-assessment after the exam with $\rho = .67$ to $.88$ and with $\rho = .27$ to $.49$ with his or her self-assessment before the exam. Table 4 shows the cross-tabulation between final marks and students' self-evaluations *before* the exam administered by Examiner 1 and with the simple marking system. This cross-tabulation is typical for the other cross-tabulations as well and shows that the low correlation is caused by incorrect expectations regarding all levels of performance.

Wilcoxon tests between the variables were carried out to check for differences in the level of marks and self-evaluations. In the first step, the marks of examiner, assessor and final mark were compared. Considering the fact that pairwise comparisons between 3 variables for 6 subsets of exams (which partly result from the same examiners and assessors) lead to 18 comparisons, a significance level of $p \leq .001$ was chosen as the lowest level that SPSS shows. There were no differences between the marks of examiner and assessor and the final mark. In the second step, the self-evaluation of the examinee before and after the exam was compared to the final mark, and the two self-evaluations were compared with each other (again 18 comparisons with a significance level of $p \leq .001$).

Table 3:

Rank correlations between evaluation by the examiner (examiner) and assessor (assessor), final mark (mark), self evaluation after (after) and before (before) the exam per combination of examiner, marking system and number of exam

	no. exam	examiner			assessor			mark			after		
		1s	1d	2d	1s	1d	2d	1s	1d	2d	1s	1d	2d
assessor	1 st	95	96	96									
	2 nd	92	98	98									
mark	1 st	97	98	99	97	98	98						
	2 nd	94	99	98	96	99	98						
after	1 st	79	84	86	78	81	89	79	83	88			
	2 nd	70	74	72	68	75	75	67	75	76			
before	1 st	45	48	38	45	48	38	46	47	37	57	61	39
	2 nd	28	46	48	29	48	50	27	47	49	31	73	62

Note. examiner / marking system 1s = Examiner 1, simple marks ($n = 518$ first exams, $n = 122$ second exams); 1d = Examiner 1, detailed marks ($n = 210$ first exams, $n = 33$ second exams); 2d = Examiner 2, detailed marks ($n = 131$ first exams, $n = 30$ second exams).

Table 4:

Cross-tabulation between self-evaluation *before* the exam and final mark for the first exams with Examiner 1, simple marking system, $n = 518$

final mark	self-evaluation before the exam					sum
	1	2	3	4	5	
1	13	36	11	3		63
2	7	68	45	7		127
3	2	60	91	17	1	171
4		15	43	15	3	76
5		12	42	23	4	81
sum	22	191	232	65	8	518

Note. Matches are printed bold.

In one subset, the self-evaluation before the exam was better than the final mark: Examiner 1, first examination, simple marking system. In two subsets, the self-evaluation after the exam was worse than the final mark: both examiners, first examination, differentiated marking system. In two subsets, the self-evaluation after the exam was worse than the self-evaluation before the exam: Examiner 1, first examination in both marking systems. The quartiles of the final mark and the self-evaluations in the conditions where differences were found are shown in Table 5.

Table 5:

Quartiles of final mark and self-evaluations before and after the exam for the conditions where differences were found

marking system	examiner	exam	N	Quartiles			
				1 st	2 nd	3 rd	
simple	1	1 st	518	final mark	2	3	4
				self-evaluation before exam	2	3	3
				self-evaluation after exam	2	3	4
differentiated	1	1 st	210	final mark	2.0	2.7	3.3
				self-evaluation before exam	2.0	2.7	3.0
				self-evaluation after exam	2.3	2.7	3.3
	2	s1 st	131	final mark	1.7	2.3	3.0
				self-evaluation before exam	2.0	2.7	3.0
				self-evaluation after exam	2.0	2.7	3.0

Correlations with preparation, exam duration and student attributes

As the correlations between the evaluations of examiner and assessor and final marks are very high, only correlations with the final marks are reported here. Table 6 shows the correlations between marks and duration of exam, duration of preparation for the exams, gender and free shot. The correlations between gender (men coded as 1, women as 2) and marks awarded are zero (ranging from $\rho = -.11$ to $.06$). When students take their first exam, the marks in “free shots” are slightly worse: $\rho = -.30$ to $-.22$. As the number of students taking a “free shot” in the second exam is very low, analyses cannot be calculated here.

The correlations between duration of the exam and marks are between $\rho = -.23$ and $.00$; there is a very slight tendency for longer exams to result in better marks. The examination regulations specify that the exam should take 25 to 35 minutes as a rule. 97.9 per cent of the exams fall in this range; the others are longer (up to 41 minutes). Five correlations between preparation time and marks awarded are between $\rho = -.12$ and $.07$; one correlation is $\rho = .58$ (with $n = 30$).

Table 6:

Rank correlations between final mark (mark) and duration of exam in minutes, duration of preparation for the exams (weeks of 40 working hours – preparation), and gender and free shot per combination of examiner, marking system and number of exam

no. exam	duration exam			preparation			gender			free shot		
	1s	1d	2d	1s	1d	2d	1s	1d	2d	1s	1d	2d
1 st	00	-03	-15	-12	-06	04	-06	-11	06	-22	-24	-30
2 nd	-23	-16	-17	07	05	58	-01	03	-05			

Note. Examiner / marking system 1s = Examiner 1, simple marks; 1d = Examiner 1, detailed marks; 2d = Examiner 2, detailed marks; gender is coded 1 = male, 2 = female; free shot is coded 0 = no, 1 = yes.

Effect of preparation

We had categorized the kind of preparation beforehand and asked each student in which category his or her preparation fitted best. As the students' answers told us that the categories did not fit well to the way they had actually prepared, we changed the category system twice in the course of the study. (I) The first version was whether the students had prepared (a) alone, (b) with one other student or (c) in a group. (II) The next version was whether they (a) had examined each other in a group or (b) not. (III) The last version of the question was whether the students had prepared (a) alone, (b) with someone else or (c) with someone else and had examined each other at some time in the process of their preparation. As there is a difference between the first exam and any repetition, we only analysed the effect of preparation on the first exam. The Jonckheere-Terpstra test showed no difference between the conditions in Version I, i.e. alone, with one other student or in a group. In Version II students who examined each other while preparing for the exam received a better mark (median = 2.7, $n = 332$) than students who did not examine each other (median = 3.0, $n = 202$) (U-test with $p \leq .001$). The Jonckheere-Terpstra test showed a difference with $p \leq .05$ between the conditions in Version III: students who prepared alone (median = 3.0, $n = 76$), in a group (median = 2.7, $n = 50$), and in a group with mutual examination (median = 2.7, $n = 89$). Two U-tests were calculated. They showed that the difference between preparing alone (quartiles 2.3, 2.7, and 3.7) and preparing in a group without mutual examination (quartiles 2.25, 2.3, and 3.0) and the difference between preparing in a group without and with mutual examination (quartiles 1.7, 2.3, and 2.7) were significant with $p \leq .05$.

Discussion

The evaluation of the students' performance was found to be extremely reliable in terms of the correlation between examiner and assessor. The correlation with the examinees' evaluation after the exam is satisfactory and shows that the examinations are indeed a content-valid representation of the universe of learning tasks. The correlation with the examinee's self-assessment before the exam has about the same magnitude as the corrected correlations for selection interview results and success in the job to be found in several meta-analyses (see for example $r = .51$ in Schmidt & Hunter, 1998). The results concerning preparation in a group and mutual examination show a tendency, namely that both lead to better results than learning alone.

Inter-rater reliability

The inter-rater reliability between examiner and assessor is at least $\rho = .92$; in our earlier study (Westhoff et al., 2002) it was $\rho = .90$ and $.94$. This shows that examiner and assessor share a common system for marking the students' performance. This is also shown by the fact that examiner and assessor do not differ in their marks. The high agreement is probably not only based on the rating of the answers but also on the system

of the questions. Both examiners try to stimulate a kind of “conversation” in the exam – i.e. by ensuring that each question is meaningfully related to the last answer and leads the thread a bit further. A typical starting question on Level 4 is “Please describe ... [a type of partly standardized procedure or method / a test / a model of deciding in assessments].” On Level 3, the exam proceeds with questions like “Can you describe ...in more detail / Can you tell me more about?” or questions addressing more detailed information. For example, for an interview type, questions addressing more detailed information might concern aim, field of application, qualification of interviewer, procedure of question generation, question format, rating of answers, reliability, and validity. On Level 2, the typical starting question is “What are the similarities and differences between A and B?”, A being the topic with which this part of the exam started on Level 4, B being another type of partly standardized method, test or model. On Level 1, the typical question consists of an outline of a problem, depicted in few sentences, followed by the question “What would you do?”. This means that the current level of the examination is relatively clearly indicated by the formulation of the questions. This level may be mastered or not – the difference is the step of 1 expressed in the marks: if the question on the Level 3 is mastered the student gets a 3; if not, a 4.

Content validity

The correlation of marks awarded and the examinee’s evaluations after the exam ranged from $\rho = .67$ to $.88$. Our earlier study (Westhoff et al., 2002) found correlations of $\rho = .67$ and $.74$, which is about the same magnitude. The cross-tabulations show that the relatively low correlations between final marks and the examinees’ self evaluations after the exam are not due to modesty on the part of the good students and overestimation of performance by the students who failed, but that incorrect self evaluations can be found on all levels. Deviations of more than one mark between the self evaluations after the exam and the final marks are rare. This indicates that the exams are a content-valid representation of the universe of learning tasks. The judgement shows that the students basically recognise the level of the exam and whether their answer was correct. This is true, though two facts make this judgement difficult for the students. Firstly, they do not necessarily know whether the content of the answer is correct. If they know the answer, they usually know that it is correct. Some exceptions occur when students use incorrect summaries. If they do not know the answer, they typically guess what might be correct. Secondly, on Levels 2 and 1, the students are not sure whether they are pursuing the right direction, with maximum subjective uncertainty on Level 1.

The correlations between the results of the exam and the examinees’ self-evaluations before the exam ranged from $\rho = .27$ to $.49$ with a median of $.46$. In our earlier study (Westhoff et al., 2002), the correlations were $\rho = .23$ and $.33$. Despite the fact that the correlation has increased, we had expected a higher correlation because we had informed the students about our system in order to allow them to prepare themselves optimally for the exam. Factors contributing to this relatively low correlation might be the fact that some students know that they are better prepared in some topics and worse prepared in

others, and that they cannot anticipate how the exam will proceed. Concerning the mean of the self-evaluation, there are some – small – differences between the self-evaluation and the final mark. In one of the six subsets the self-evaluation before the exam was better than the final mark, in two of the six subsets the self-evaluation after the exam was worse, and in two subsets the self-evaluation after the exam was worse than the self-evaluation before the exam. These comparisons show that before the exam the students have realistic expectations concerning the exam and how far their knowledge matches the demands. After the exam they are more critical concerning their performance. When asked for their self-evaluation after the exam some students start with a comment on what they did not know. Other typical comments are that they did not manage to present a topic as well as they had intended when preparing for the exam. The contrary – that students start commenting on what they knew – can be observed less often.

Fairness

The zero correlations between gender and marks awarded show one aspect of the fairness of the exams. There is no reason to assume that men and women who have to pass the same approval procedure in order to study psychology in Dresden differ in their abilities or motivation in any way which might affect their marks. Other aspects of fairness are shown by the correlations between duration of the exam and the mark, which were between $\rho = -.23$ and $.00$. The finding that there is a very slight tendency for longer exams to result in better marks can be explained by the fact that the examiners like to be sure whether a student has mastered a level before going on to the next part of the exam. Five correlations between preparation time and marks awarded are between $\rho = -.12$ and $.07$, one correlation is $\rho = .58$ (with $n = 30$). This shows – as does the low correlation between students' self-evaluations before the exam and the final marks – that students do not prepare for the exam in the best possible way. Due to the approval procedure for university entrance, the range of intelligence in psychology students is rather narrow. For this reason, the explanation that the cleverer students need and use less preparation time can be ruled out. As an anonymous reviewer pointed out we cannot rule out potential biases in the self report data.

Preparation

The free-shot exams were introduced by law in order to encourage students to take their exams early. The three correlations between free shots and marks are between $\rho = -.30$ and $-.22$, showing that students taking a free shot get slightly but consistently worse marks. When asked whether the exam was a free shot, some students – typically those with good marks – said that it was a free shot legally (as they had enrolled for the exam within the standard period) but their intention before the exam was not to repeat it. Some students – typically those with bad marks – said that they had not prepared thoroughly and were just using the free shot to find out what sort of questions are asked. (It should however be noted that, if the examinee agrees, students who are not taking the exam in

the same exam period are allowed to listen in on an exam.) These two extreme remarks show the range of how examinees understand a free shot.

Our results concerning preparation in a group are inconclusive. We changed our question several times. In Version I, we found no difference between preparation alone, with one, or with several other students. In Version II, examining each other led to superior results compared to preparing alone. In Version III, students who had prepared in a group without mutual examination got better marks than students who had prepared alone; students who had prepared with mutual examination got even better marks. Of course we cannot rule out differences in working style except preparation in a group between these groups, but our results hint at the fact that preparation which forces the students to express their knowledge leads to better results, which might be caused by better understanding or by better fluency of explanation or both.

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