

1 The Underlying Mindset

The term “adaptive” of the intelligence test-batterie AID (*Adaptive Intelligence Diagnosticum*) – currently: AID 3, or even more precisely AID 3.2 for the second version of the third generation (in German: Kubinger & Holocher-Benetka, 2023; in English: Kubinger, 2017) – refers to a unique selling point based on psychometrics. This is especially dealt with in Chapter 8 and already foreshadowed below in Subsection 1.2. In this Chapter 1, however, we focus primarily on the specific perspective of the test-battery AID. The underlying mindset is: to provide “help (aid) for the child/adolescent”.

Apart from obligatory appreciation and respectfulness for the test taker as claimed by psychologists’ ethics guidelines and from widespread doctrinal opinion, respectively, the following claim is applied: “The TA [test administrator] makes sure the test takes place in a pleasant and relaxed atmosphere for the test taker, that is, a setting – maybe in contrast to school – which offers time, care, and optimal involvement opportunities. Without provoking any exam stress, the TA shall motivate the test taker to strive for an appropriate achievement in the test.” (Kubinger, 2017, p. 77). That is, the test setting must be designed to enable the test taker’s highest possible individual performance!

The answers to frequently asked questions (FAQ) exemplifies that claim to some extent (closely following Holocher-Ertl, 2012):

ad:

“Subtest 2 *Competence in Realism* aims to measure the ability to understand the functional properties of everyday objects. – *The test taker has to detect a missing part of objects, each displayed on a picture card. It is sufficient for him/her to point to the place where something is missing.*” (Kubinger, 2017, p. 9).



- (FAQ) How is it to score if in subtest *Competence in Realism* a test taker correctly points to the place on an object picture card where something is missing, but verbalizes the solution incorrectly (e.g. instead of “reins” for item 3 in block 1 “rider”, the test taker says: “cord”, which is incorrect as “cord” does not fulfil the function of (a horse’s) “reins”?

The test instructions read as follows: “If the test taker tries to give a verbal response which seems difficult for him/her, it should be repeatedly made clear to the test taker that pointing is sufficient.” (Kubinger, 2017, p. 93). As a consequence, in the given case the item has to be scored as solved: The subtest is about the ability to know what is essential for the functioning of a particular object, so that its absence can be recognized when displayed on an image. In this case, the test taker can be criticized for not using (knowing) the exact term or, moreover, for not yet fully understanding the function in question, but he/she has recognized what is missing. To accuse him/her of (partially) not understanding the function of the object shown would be unfair in comparison to those test takers who also suffer from a lack of understanding but have not named the solution word at all and instead have only pointed to the correct

position – bear in mind, that of course a linguistic formulation of the solution is not necessary when this subtest is carried out non-verbally, which also is optional offered.

ad:

an item example

“Subtest 3 *Applied Computation* shall measure the ability to solve everyday Numerical problems, primarily by reasoning and without applying any high-level school numeracy techniques. – *The test taker has to solve textual numeric problems. Difficult items will not only be read to the test taker, he/she may additionally read the item by himself/herself.*” (Kubinger, 2017, p. 10).

There are 5 ladybugs sitting on a leaf. 3 fly away. How many are still sitting on the leaf?



- (FAQ) Given it is obvious that the test taker often miscalculates in the subtest *Applied Computation* when calculating in his/her head, should he/she be repeatedly reminded to use the paper and pencil provided?

The test instructions read as follows: “If necessary, the test taker should be encouraged to use the paper and pencil provided.” (Kubinger, 2017, p. 96). Of course, such a hint should not be given too often and certainly not for all incorrect answers. Practice shows that two or three times such encouragement is sufficient.

- (FAQ) What procedure is recommended if in the subtest *Applied Computation* younger children, who only have the items read to them but cannot read along, do not remember essential contents?

The test instructions read as follows: “At the test taker’s request, the item may be read out to the test taker again, but this should not happen regularly.” (Kubinger, 2017, p. 96). That is, if the test administrator assumes that the test taker was unable to memorize important information he/she can read out items a second time, slowly and verbatim – however, this must not happen for all items, particularly not for more than two or three in a sequence. It should be noted that due to this frequently asked question, relevant items for children who cannot yet read have been visually supported by corresponding pictures since the third generation of AID; as a result, it is hardly necessary to memorize essential item contents.

ad:

an item example

“Subtest 5 *Immediately Reproducing-numerical* shall measure the (verbal-acoustical) capacity of serial information processing. – *The test taker has to repeat sequences of arbitrarily presented digits completely and consecutively.*” (Kubinger, 2017, p. 10).

$8 - 1 - 5$

[There are two item sets, “forwards” and “backwards”]

- (FAQ) In the subtest *Immediately Reproducing-numerical*, is it permissible to point out in case that the test taker has mixed up the order of the numbers?

The literal requirement is that the test taker “must repeat the numbers in exactly the same order.” (Kubinger, 2017, p. 112). In such a case, the test administrator may therefore repeat this requirement once for each of both item sets (“forwards” and “backwards”).

- (FAQ) In subtest *Immediately Reproducing-numerical*, is it permissible to present the sequence of numbers again if a disturbance occurred during the first presentation (e.g. coughing of the test taker)?

In such a case, the test administrator should use a correspondingly long sequence of numbers from the other item set instead of re-presenting the original sequence.

ad:

"Subtest 6 *Producing Synonyms* shall measure the ability to understand the concept of a word and the ability, respectively, to use an alternative word instead. – *The test taker is (orally) confronted with words for which he/she has to (orally) give an alternative word which essentially has the same meaning.*" (Kubinger, 2017, p. 11).

an item example

Tell me another word for: **lady**.

ad:

"With the subtest 9 *Verbal Abstraction*, the ability to generate and verbalise concepts by means of abstraction, shall be measured. – *The test taker has to find and describe the essential common function of pairs of presented objects.*" (Kubinger, 2017, p. 12).

an item example

How are **aeroplane** and **bird** alike?

ad:

"With subtest 11 *Social Understanding and Material Reflection* the ability to incorporate comprehension of factual everyday connections and the knowledge of socially expected behaviour, shall be measured. – *The test taker is (orally) asked questions which he/she has to (orally) answer.*" (Kubinger, 2017, p. 12).

an item example

Why do lots of people do sports?

- (FAQ) When is it permissible to score an item as solved in the subtests *Producing Synonyms* and *Verbal Abstraction* even though the test taker's answer is not listed among the answers provided in the manual?

While the test instructions only read: "Colloquial (dialectal) expressions must be scored as correct, provided that they have the same meaning as the listed solutions" (Kubinger, 2017, p. 114), the manual states more precisely: "For items where a question is to be answered, more than one single solution is often listed in the item catalogues; these solutions are separated by semicolons (;,'). To score an item as solved in this case, the test taker only has to produce one out of such a list. However, sometimes this list is not exhaustive: equivalent, particularly colloquial (dialectal) expressions must be scored as correct." (Kubinger, 2017, pp. 78f.).

- (FAQ) In subtest *Social Understanding and Material Reflection*, is it permissible to score an answer as correct, if it is formulated differently than the solutions listed in the item catalog but expresses the same content.

The manual states: "... sometimes this list is not exhaustive: equivalent, particularly colloquial (dialectal) expressions must be scored as correct." (Kubinger, 2017, p. 79).

ad:

"Subtest 7 *Coding and Associating* aims to measure two partially independent abilities: speed of information processing and incidental learning ability. – *The test taker firstly has to code symbols according to a given key pattern and secondly, from memory.*" (Kubinger, 2017, p. 11).



- (FAQ) In the subtest *Coding and Associating*, if the test taker gives the impression that he/she is not hurrying, is it permissible to remind him/her to work quickly?

According to the test instructions the test administrator may repeat once: "Also work quickly" (Kubinger, 2017, p. 121).

ad:

"Subtest 8 *Anticipating and Combining-figural* shall measure deductive reasoning ability in regard to recognising and composing an everyday object in its entity ("gestalt") with fragmented pieces only. – *The test taker has to combine several pieces each to form the figured objects.*" (Kubinger, 2017, p. 11).



- (FAQ) In the subtest *Anticipating and Combining-figural*, is it permissible to correct the anchor piece of an item back to the correct position whenever the test taker rotates it?

The test instructions read as follows: "The TA [test administrator] must ... prevent the test taker from rotating the anchor piece: 'The way this piece is laying here is already correct'." (Kubinger, 2017, p. 122). As a consequence, the anchor piece must always be brought back into the corresponding position for all items.

However, for providing "help (aid) for the child/adolescent", also certain technical accesses are necessary and favorable, respectively.

1.1 Individual Test Administration

In particular, conceptualizing a (paper-and-pencil) test for individual administrations seems advantageous, i.e., a test setting for solely a single test taker.

First, this makes it possible to capture the mental experience and, in particular, the (thinking-based and reasoning) behavior of a person interactively. That is, there is an interactive process of the test taker with another person, the test administrator. In contrast to tests that are designed to be administered to a whole group of test takers, the testing situation is therefore essentially based on a social component. This is crucial with regard to the ecological validity of the test, because every day (cognitive) performance is often required in interaction with an (authority) person. Of course, individual administration risks lower objectivity as concerns the test-results' independence of the person who is administering the test. However, with respect to getting practically very relevant information the standards of psychological test construction theory must not be overdone: there is the potential of a high "diagnostically added value"

when individual testing situations with corresponding tests take place. According to Kubinger, Deimann, and Kastner-Koller (2012), this added value refers to clues that only facilitate the creation of hypotheses, the verification or falsification of which ultimately contributes to answering the question posed in psychological counseling.

Second, a test which is to be administered individually in a test setting designed for a single test taker also allows other tasks or processing methods compared to tests administrable even in a group of test takers. While the latter only allow written processing (of lexical, numerical, or figural contents), individual tests allow “verbal-acoustic” tasks, i.e., those that refer to acoustic comprehension and verbalized action (based on lexical or numerical contents). Additionally, they enable “manual-visual” tasks, i.e., those that require visual apprehension and manual-productive acting with various (pictorial-figural) materials. Thus, the matter is the mental experience and, in particular, the (thinking-based and reasoning) behavior of a person when interactively handling such materials. Thereby, at least indirectly, the haptic perception ability can be captured, that is the active feeling of objects with regard to their essential properties. This concerns both the so-called surface sensitivity (tactile perception) and the so-called depth sensitivity (kinaesthetic perception/proprioception) of a person. Consequently, a child’s or adolescent’s ability to deal with words and symbols is possible to be compared with their ability to handle objects and to grasp visual shapes (“gestalt”-s). At first glance, such “manual-visual” tasks may seem outdated, perhaps even inappropriate nowadays, due to the electronic possibilities available and the recent demands of a “digitalized” (working) world. There is no doubt that suited designed computer procedures could complement the non-computerized tests just mentioned. But they cannot replace them: Although “virtual handling” is becoming increasingly necessary for all kinds of everyday requirements, actual handling will always be necessary for everyday life. Household work alone comes to mind, which often requires basic skills in certain trades (e.g. cook, tailor, carpenter, electrician, plumber). And that refers even more to perpetual professional or training requirements. In addition to skilled trades also many artistic professions (e.g. instrumental musician, sculptor, painter), several healthcare professions (e.g. neurologist, physiotherapist, geriatric nurse) and laboratory professions (e.g. chemist, pharmacist) are concerned. Yet it is not even mentioned the important relation of thinking and acting as disclosed in Developmental Psychology, namely the (material-referring) execution of actions as a necessary preliminary stage of internalized thinking or problem-solving cognitive behavior (cf. Galprin, 1979). This means that, especially with young children, only observing their handling of respective materials makes it possible to assess the quality of their problem-solving process.

Third, only a test conceptualized for individual administration additionally enables a qualitative assessment of a test taker’s work habits and social contact behavior in performance situations: this with regard to a wide range of facets such as fine and gross motor skills, working speed, (sustained) attention and endurance or verbal expression (see for details AID’s *Supplemental sheet for categorising a testee’s* [i.e. test taker’s] “*attitude to work*” in Fig. 1.1;

transcribed from Kubinger, 2017). Such assessments may not only decisively contribute to the final established diagnosis of a case counseling, but (casual) observations can particularly create hypotheses in the course of the investigation process: these are about any mutual causes of given circumstances. Box 1 to Box 4 illustrates several examples, which hypotheses may have popped up because of casual observations when testing a child/adolescent with the AID.

<i>Achievement motivation</i>	apathetic, disinterested	keen, eager to perform	excessively achievement-oriented
<i>Attitude towards work</i>	socially oriented	(appropriately) task/goal oriented	extremely (specifically) task oriented, strives for achievement
<i>Alertness</i>	fluctuating, easily distracted	well concentrated	restricted, rigid
<i>Endurance</i>	gives up easily, tires quickly	good stamina	dogged, has trouble concluding
<i>Operation accuracy</i>	superficial, cursory	careful, exact	meticulous, perfectionist
<i>Work pace</i>	slow, sluggish	(appropriately) rapid, swift	hectic, hasty
<i>Independence/ autonomy</i>	seeks help and reassurance	(age-appropriately) independent, tractable	rejects help, willful
<i>Self-evaluation</i>	insecure, underestimates self	secure	overestimates self
<i>Tolerance of frustration</i>	disheartened, despondent	increases exertion, accepts failure	tries to distract, becomes aggressive, rationalizes
<i>Task criticism</i>	overly critical	problem-appropriate	uncritical
<i>Prevailing mood</i>	sad, subdued, fearful	even-tempered	overly cheerful, frolicsome
<i>Drive</i>	listless, languid	(appropriately) active	overactive, driven
<i>Contact behavior</i>	self-conscious, shy	sociable	uninhibited, no personal distance
<i>Perception</i>	confuses, rotates spacial location	sensomotorically coordinated	fails to differentiate (visually, acoustically) well
<i>Gross motor skills</i>	not very mobile, clumsy	calm	unsettled, fidgety
<i>Fine motor skills</i>	undifferentiated, uncoordinated, shaky	adept	cramped, awkward
<i>Handedness</i>	left dominant	right-left integrated	alternating, ambidextrous
<i>Language</i>	silent, shy of speaking	communicates appropriately	talkative, speaks excessively
<i>Articulation</i>	stutters, clutters	speaks clearly	speaks indistinctly, stammers, twangs
<i>Wealth of verbal expression</i>	simple, ungrammatical	articulate	contrived

Figure 1.1: The Supplemental sheet for categorising a testee’s [i.e. test taker’s] “attitude to work” (qualitative assessment of his/her working and contact behavior; akin Kubinger, 2017, p. 33)

Box 1

For example, in a specific AID subtest where the task is to arrange certain materials (puzzle pieces or so-called logical blocks or some cubes), the test administrator may demonstrate the solution but does not place several pieces one hundred percent exactly together.

item presentation →

processing →

solution

For instance, in the subtest *Anticipating and Combining-figural* the test taker has pieces to combine correctly to form a pictorial object; no template of the object is given, nor is the test taker informed which object is to be made.



Now it could happen that a tested child fails an item, but when the test administrator demonstrates the solution, it corrects him/her so that the position finally fits one hundred percent. In the *Supplemental sheet for categorising a testee's "attitude to work"* the test administrator may then mark under *Operation accuracy*: meticulous, perfectionist. If the child was presented to counseling due to school difficulties (poor school performance in many subjects), the following can be hypothesized from that casual observation: "The behavioral disorder (possibly associated with the personality trait 'tendency to perfectionism' – or possibly associated with a role model behavior in the family) hinders the child in performing well, whereby the quality of performance required by the school is lower than the self-imposed standard on the part of the child."

Box 2

For example, in a specific AID subtest which task is to arrange certain materials (puzzle pieces or so-called logical blocks or some cubes), a 6-year-old child could try to pick up and arrange the given pieces, pads, or cubes with his/her left hand and then however others with his/her right hand.

Given pads,
an item example

For instance, in the subtest *Formal Sequencing* the test taker has to add a pattern sequence of pads (with different colors, shapes and sizes) appropriately.



In the *Supplemental sheet for categorising a testee's "attitude to work"* the test administrator may then mark under *Handedness*: alternating, ambidextrous. If the child was presented to counseling due to massive writing difficulties, then the following can be hypothesized from that casual observation: "The child's handedness is not yet fixed/developed in one hand as the dominant hand; regardless of whether urged by others to use a particular hand when writing or not, he/she is developmentally delayed compared to peers."

Box 3

For example, a child who fails on a certain item could brusquely reject the test administrator's help (as recommended in the test manual), possibly even getting rough, and perhaps comment something like: "Leave me alone!"

In the *Supplemental sheet for categorising a testee's "attitude to work"* the test administrator may then mark under *Independence/autonomy*: rejects help, willful. If the child was presented to counseling due to behavioral problems in dealing with teachers (does not follow

instructions, resists required ways of acting), then the following can be hypothesized from that casual observation: “The child’s low self-esteem prompts it to prove itself in order not to lose any more self-esteem.”

Box 4

For example, a child could make detailed comments during the entire test, when asked and especially when not asked by the test administrator, and try to tell long-winded stories that are only associatively related to the given topic or are taken completely out of context.

In the *Supplemental sheet for categorising a testee’s “attitude to work”* the test administrator may then mark under *Language*: talkative, speaks excessively. If the child was presented to counseling due to behavioral problems as per questionable ADHD (attention deficit/ hyperactivity disorder), then the following can be hypothesized from that casual observation: “The child has a strong desire for recognition and is keen to be noticed, accepted, respected and acknowledged or suffers from not receiving all of this from others.”

Finally, fourth, a test to be administered individually in a setting for a single test taker also allows, in contrast to tests designed for a whole group, to generally dispense the use of a multiple-choice response format. The latter is not only problematic because correct answers can also only be the result of lucky guessing; more importantly, tests with a multiple-choice response format essentially only measure the ability to recognize the solution, but not the ability to produce the solution itself. Furthermore, the processing of the tasks in group tests is usually limited in time, so that slow test takers work on fewer items, but the ones not worked on are counted as not solved (see Kubinger, 2021). Such tests therefore do not render enhancement-oriented assessment, as the cause of a poor test performance cannot be unequivocally identified: Is it due to a lack of ability or due to a lack of speed (or due to both)?

1.2 Ensuring Reasonableness for the Test Takers

One particular aspect of conceptualizing a test (-battery) in order to provide “help for the child/adolescent” concerns the unique selling point of the AID already mentioned above, i.e., adaptive testing.

Crucially, the concept of “adaptive testing” is not self-explanatory. In particular, it does not refer to the case where, according to the test instruction, a test must be terminated after too many incorrectly answered items. Nor does it refer to the case where some very easy items are not administered because the test taker is old enough, but those items are scored as solved (if he/she solves certain more difficult items). Admittedly, such a “flexible” approach, as implemented in competing products, means a kind of adaptation of the administered test items to the individual performance. However, “adaptive testing” is actually a *terminus technicus* within psychometrics: it is strictly conditioned on models of the *Item Response Theory* (IRT). To put it simply, there happens an optimal selection of items to be administered on the basis of a test taker’s performance on preceding items and on the basis of the probability with

which he/she will solve the items according to the prediction of the model used (see for the theory of adaptive testing in details Kubinger, 2016). Be aware that the “flexible” approach as just mentioned with regard to competing products, i.e., item selection outside the IRT framework, would rule out a fair comparison of the performance of test takers who have worked on (partially) different items: Only IRT-immanent comparisons master to be fair.

In the context of reasonableness, adaptive testing is compelling as follows – according to Testkuratorium (1986), a test fulfils the psychometric quality criterion of *reasonableness* if the test taker is spared unnecessary burden – both in absolute terms and relative to the benefits of the test’s application – with respect to time, mental demands (especially energetic-motivational and emotional aspects), and physical demands. Adaptive testing now has proven to be quite more economical in comparison to conventional testing (when every test taker is administered with the same items): roughly said, for the same measurement accuracy approximately only half the number of items is needed. As concerns the test-battery AID, instead of commonly used 30 items (with a grain of salt) only 15 are needed in most of the subtests! Hence, if only half as many items are presented, this means that the required energetic-motivational effort for each test taker (in each subtest) is lower. This efficiency permits the counseling psychologist to reinvest the saved test administration time and the test taker’s minimized energetic-motivational effort, respectively, into supplementary tests or assessment methods – which can ultimately only lead to providing “help (aid) for the child/adolescent” as is the mind-set.

Adaptive testing does not only achieve sufficiently accurate measurement with comparatively few items – thus minimizing time and the test taker’s energy expenditure. But it also ensures he/she is not confronted with (many) items that are (too) easy or (too) difficult for his/her ability level: Even if he/she fails two or three items in a row, he/she is very likely to solve the next therefore less difficult item(s), so that frustration is kept to a minimum; similarly, if a test taker solves several items in a row, he/she will soon be confronted with a (much) more difficult item, so that he/she is hardly discouraged to work hard. But both of this is to be expected with competing, i.e., conventionally administered products, and this is there repeated in every subtest.

This advantage of the AID applies since ever, when at the very beginning adaptive testing was realized only according the strategy of branched testing – there the items are clustered according to some intended cluster average of item difficulty parameters, so that after each administered cluster of items that item cluster is presented next which fits best to the test taker’s performance achieved so far (see for an illustration of the resulting economy in Chap. 8). However, the given conclusions apply all the more since the test-battery AID optionally also offers as an alternative the optimal strategy of adaptive testing, that is tailored testing (Kubinger & Spohn, 2017, as well as in progress): Thereby, after each administered item that item is at once calculated by a computer and presented to the test administrator which fits

best with the test taker's performance achieved so far. That is, using computer support for the optimal item selection raises even further a test's economy, and matter-of-factly saves for most auf the AID subtests additional three to four items on average, instead of already only 15 items as with the branched testing strategy (see for details again in Chap. 8). Consequently, the goal of minimizing a test taker's energetic-motivational effort and his/her risk of becoming frustrated or discouraged is exceeded.

1.3 Identifying Risk, Protective, and Development-Promoting Factors

Due to the challenge of identifying the inhibiting, protecting, or stimulating conditions for a person's personality progress (Teichmann, Meyer-Probst, & Roether, 1991; see already in the Introduction), the test-battery AID looks for a test taker's cognitive risk factors, protective factors, and developmental-promoting factors. The basis of this test-battery is therefore purely pragmatic rather than construct-related in terms of any intelligence theory: It tries to measure very many (complex as well as basal) cognitive abilities which all seem to be responsible for "intelligent" behavior. Indeed, this pragmatic reality of given sub- and add-on-tests results in a dimensionality and factor structure of measured abilities which do not reflect any pertinent intelligence theory.

This approach definitely suits Cattell's (1963) investment-model of ability ("knowledge is invested intelligence"). The definition on which the test-battery AID is based is: "*Intelligence is the entirety of all cognitive conditions which are necessary to acquire knowledge and develop action competence* – whereby 'cognition' refers to all processes which lead to a person's information and awareness of his/her surrounding world (that is perception, recognition, imagination, judging, memory, learning, thinking, speaking)." (Kubinger, 2017, p. 23; the first time stated by Kubinger, 2009, in German). Consequently, this definition encompasses even basal sub-domains. That is, the AID pursues also to serve as a screening for the determination of *specific learning disorders* – according to the neuro-psychological argumentation of Lurija (1973) that the successful accomplishment of any complex mental function (such as memory, perception, learning, intelligence, speech, or volitional motoric) requires a (well-coordinated) system of sub-domain capacities, i.e., basal, non-complex neurological functionalities.

In fact, today there is often a greater need to clarify *specific learning disorders* than to determine the extent of "intelligence" when it comes to psychological expert questions relating to learning or school difficulties, concentration disorders or behavioral problems in children or adolescents. Particularly AID's test character range of "intelligence" (i.e. the range of all sub-test-scores) is of relevance, in the first instant. If this test character is comparably high, it indicates a problematic profile of cognitive abilities. Apart from psycho-social, especially milieu-related risk-manifestations and personality-related risk-manifestations this may be caused cognitively, that is as a result of a *specific learning disorder/ partial performance weakness* (see in the Introduction and in detail in Subsec. 4.2) or similar biological risk-manifestations

(e.g. *minimal cerebral dysfunction*) – take into account that also extreme specialized giftedness might be responsible for a high range of “intelligence”. In the second instant, of course, all the subtest-scores considered in relation to one another are of important relevance. Indeed, the test-battery AID makes propaganda for profile interpretation with respect to all the subtest-scores; in other words, the interpretation of performance highs and lows.

Obviously only a profile interpretation with regard to (inter- and) intra-individual strengths and weaknesses may lead to relevant (support) measures. This is in line with the motto: If all strengths (resources) are known and an attempt is made to use them, any weaknesses should be reduced or even compensated for by specific support programs, or at least their progressive development should be slowed down. And that means enhancement-oriented psychological assessment!

1.4 Minimizing the Influence of Prior Educational Achievement

The contents of the task of each subtest in the test-battery AID are designed mostly with topics from (children’s) everyday life. This corresponds to the claim for offering the test taker optimal opportunities for unfolding his/her abilities in the tests in order to gain an insight into the test taker’s upper performance limits. Consequently, the subtests’ operational definition sometimes explicitly refers to everyday objects; for instance, for subtest *Everyday Knowledge*: “... shall measure the ability to inform oneself about things that are commonly present nowadays” (Kubinger, 2017, p. 9).

Focusing on everyday objects helps measure the targeted cognitive abilities with relative independence from the amount of education a person has received. It is not about measuring general education and therefore the tests hardly refer to issues that are (only) taught at school, but rather target the ability to be informed about certain topics and to be able to reflect on them, based on experiences in daily life and findings of issues which confront one every day. This concept is rooted in the idea that “intelligent” behavior of a person implies respective interests, that is, the key question is, which knowledge and skills (action competence) has a child or adolescent gained by inquiring and interested behavior.

Of course, a minor level of schooling is needed for several tasks, but the competence of cultural techniques is supposedly adequately low. For instance, the operational definition of subtest *Applied Computation* is: “... shall measure the ability to solve everyday numerical problems, primarily by reasoning and without applying any high-level school numeracy techniques.” (Kubinger, 2017, p. 11). This means that the arithmetic operations are numerically simple; moreover, items with more complex problems do not require a high level of competence in dealing with numbers.

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2 Counseling Problems Addressed with the AID

In the manual of the English version of the test-battery AID 3 (*Adaptive Intelligence Diagnosticum 3*; Kubinger, 2017) the application fields are given as: “school- and educational psychology; developmental psychology; clinical psychology; vocational and educational counseling” (p. 3). In order to make these fields more informative, a representative overview of counseling problems solved by AID are given in the following. They all are published as single case study each⁷, demonstrating deliberately the counseling problem of the client/patient as well as the interpretation of the results of AID’s application due to a helpful proposal for intervention. We outline them one after the other. Moreover, an appendix provides a list of further published case studies applying the test-battery AID.

Heading: Verification with regard to high performance potential

(Cf. Holocher-Benetka, 2021, pp. 41-53): The kindergarten teachers of 6-year-old Leon, who could already read and was also very gifted in arithmetic, worried that he would be under-challenged when he started elementary school and therefore advised a giftedness assessment. Application of AID by the consulted psychologist yielded a far above-average overall result (percentile rank > 99.9) with a very homogeneous intelligence profile in the subtests. However, it is noticeable that Leon had a wrong pencil position and traced characters inaccurately, which fits in with the kindergarten teachers’ statements that Leon has difficulties with cutting and crafting. Because fine motor skill difficulties are a serious risk factor for underachievement in gifted and highly gifted children, the psychologist recommended ergotherapy to improve fine and visuo-motoric skills. It was also pointed out that Leon’s outstanding cognitive talent requires individual support from the very beginning of school so that he does not lose his motivation and enthusiasm to achieve in a school context. Six months later, Leon’s mother reported that the ergotherapy had led to a severe improvement in fine motor and visuo-motoric skills and that school enrollment had gone smoothly. Another six months later she reported that Leon had skipped Year 2 on the urgent advice of the teachers and was now attending Year 3, mastering the performance requirements there without any problems.

Heading: Long-term behavioral problems at school and recent performance problems

(Cf. Gerstenberger-Ratzburg, 2021, pp. 67-75): The parents of 9-year-old Marvin asked for psychological counseling in a pertinent institution, because the school administration recommended further schooling at a special school due to long-term (emotional/social) behavioral problems and recently also major performance problems. This, after the responsible special

⁷ although most of them are only published in German

education teacher diagnosed by means of some Cattell's culture-fair test an "alarmingly low" IQ of 95. The psychologist now used the test-battery AID. There were many outstandingly good subtest results. And it was observed that the more difficult the items became, the more committed Marvin proved to be. Despite an IQ of 130, the results in the two most demanding visuo-motoric subtests were (significantly) below average. As already observed during the administration, he proved to be visually confused or overwhelmed when working on the corresponding items. This explains the poor performance in Cattell's culture-fair test. The psychologist concluded that Marvin is a child with far above-average talent, most likely even a highly gifted child. But he suffers from a severe visual perceptual disorder, which leads Marvin to show symptoms of ADHD (attention deficit/hyperactivity disorder) due to his as yet unknown weakness. The psychologist therefore recommends therapy for his perceptual disorder and an increasingly intense challenge at school.

Heading: Unwillingness to attend school

(Cf. Kubinger, 2019, pp. 390-400): The 8-year-old girl Melanie has been psychologically examined because of a reluctance to go to school and poor school performance. The point of question was whether a lack of intelligence was responsible for these problems. In the test-battery AID, Melanie exhibits pronounced fluctuations in test performances. Alongside several striking good results, her performance was particularly poor in all areas requiring sequencing ability; that is in those areas where temporal, sometimes also spatial, and ultimately logical sequences must be mastered. The consecutive diagnosis of a *partial performance weakness* in sequencing was supported by parental observations. However, her working attitudes proved to be quite good, especially her achievement motivation, when she liked a task. The impression was that she wants to be extremely self-determined in terms of her age and thus does not do things that she does not want to do. The psychologist's proposed interventions referred to a professional training program in order to minimize or even get rid of the weakness in sequencing.

Heading: Increasing deterioration of performance in school

(Kubinger, 2020, pp. 1-6): "A 12-year-old boy, Leonhard, appeared at a counseling psychologist because of increasing deterioration of performance in school. ... by means of AID he proved to have outstanding cognitive abilities, however, has a particular weakness in a specific cognitive area: a comparably striking slow processing ability of visual stimuli (visuo-motoric coordination). ... The established extraordinary giftedness of Leonhard suggests that he may often be mentally under-challenged at school. This circumstance, accompanied by his individual weakness in visuo-motoric coordination, has led to big problems in achievement motivation for him, and probably as a consequence, he developed adverse working behaviour in the last few years, which his parents perceive as deficient alertness resulting in the refusal to perform

at school. During the psychological assessment, however, the boy showed that when he is challenged by tasks which suit his high level of ability, he is very attentive and given such challenges, he is not easily distracted, but rather persistent. To improve his 'attitude to work' in the educational context, individual support is advised, appropriate to his high giftedness. It therefore appears crucial that good performances are positively reinforced. Challenging and fun tasks should enhance his achievement motivation and reinforce his joy in studying. An additional learning therapy is recommended, which should facilitate successful learning strategies, should stimulate advantageous working behaviour and competence in handling his homework." (See also Kubinger, 2017).

Heading: Dyscalculia in question

(Kubinger, 2017, pp. 66-70): "Following the suggestion of her teacher, Chiara, 8;3 years old, became a client at an institute for educational-psychological counseling. At the time of the testing, she attended elementary school and was displaying great problems in math. Moreover, Chiara needed a lot of support in other subjects to master the school demands. Her mother was therefore asked by the teacher to look for professional help to uncover the reason for Chiara's problems. ... Chiara proves [by application of the test-battery AID] to be a normal gifted ... child. However, due to the test results and the reported problems in fine and gross motor skills as well as in space localisation she suffers from a 'partial performance weakness': there is a perception disorder in the tactile-kinaesthetic domain and a proprioceptive perceptual disorder, respectively. Ergotherapy is recommended in order to improve this weakness." [Apart from this unexpected diagnosis and conclusion, because of] "Chiara's very poor performance in subtest 3 *Applied Computation* ... dyscalculia, as suspected from the very beginning, [becomes likely, and is finally] confirmed by the test results of the additionally administered neuropsychological tests ... so that calculation training programs are strongly recommended in order to see an improvement."

Heading: Suspected hyperkinetic disorder with "oppositional social behavior"

(Cf. Kubinger, 2009, pp. 75-79): After several unhelpful outpatient visits the 7;11-year-old Stefan was admitted as an inpatient to a therapeutic pedagogy department for verification regarding a suspected hyperkinetic disorder with "oppositional social behavior" (restlessness, aggressive behavior, outbursts of anger at school and at home). Although, by applying the test-battery AID, Stefan proved to have, overall, average cognitive abilities, a *partial performance weakness* must be assumed, namely an acoustic discrimination weakness – there was neither evidence of any language comprehension problem nor of a general auditory defect. In addition, mild auditory memory impairment was noted. Both explain that he cannot follow the lessons sufficiently. And this in turn makes the reported behavioral problems explainable. First of all, relevant enhancement programs in the area of acoustic perception have to be

carried out professionally, outside of school. Inside school the teacher should support Stefan with appropriate visual material when acoustic efforts are demanded.

Heading: Suspected psychosomatic complaints because of cognitive overload

(Cf. Kubinger, 2009, pp. 79-82): Although the 10-year-old Erik is born in Vienna (where the national language is German), his first language is Romanian and the family only started speaking German with him shortly before he entered kindergarten, at the age of three – Romanian is still spoken at home and with all relatives. Because the medical examinations did not disclose any positive findings with regard to Erik's occasional abdominal pain and his headaches at school, the pediatrician treating him referred his parents to a psychologist for clarification as to whether some cognitive overload was (partly) responsible for the complaints. The test-battery AID proves that Erik's overall cognitive performance is average to above average. But he has a massive weakness in elementary language comprehension, that is in grasping the meaning of language-bound terms. Another weakness became evident in his ability to arrive at concept formation through abstraction. These phenomena are readily explained by his bilingual language background. That is, Erik lacks sufficient mastery of the language of his current living environment as a substantial cultural technique. This necessarily takes him enormous energetic-motivational effort which means a remarkable mental burden, very likely causing his abdominal pain and headaches at school. He needs intensive professionally guided extracurricular language training.

Heading: Verification of an attention deficit/hyperactivity disorder

(Cf. Koch & Jires, 2021, pp. 200-225): Due to a pediatrician's referral the 9-year-old boy Felix has been psychologically assessed with regard to a suspected ADHD (attention deficit/hyperactivity disorder). The mother reported that Felix was a happy and well-adjusted child. However, he has great difficulties with attention and working speed. He is easily distracted and his performance fluctuates greatly. Moreover, Felix is boisterous and wild, with very restless motor skills. He has difficulty sitting still and needs lots of physical exercise. The psychologist applied, apart from questionnaires (as well for the parents as for Felix) and several achievement tests (concerning attention, reading, writing, and calculating) the test-battery AID. The result of the latter was: Although Felix' verbal talent proves to be slightly above average (the "primary" intelligence quotient, which refers to the verbal-acoustic subtests, amounts to 114), the so-called (lower margin of) intelligence *quantity*, i.e., his cognitive minimal ability, is rather low (percentile rank = 38). And the so-called range of "intelligence", i.e., the difference between highest and lowest subtest performance, is rather high (percentile rank = 84), indicating a very inhomogeneous profile of test results. Appealingly good is his "attitude to work" and his willingness to perform. In summary, the psychologist assessed that Felix has age-appropriate cognitive ability but primarily has attention problems (ICD-10: F90.0 Disturbance of activity

and attention). Attention training should provide the child with action-relevant knowledge about attention problems and promote basic attention-relevant skills (looking closely, listening carefully, describing accurately, listening carefully and retelling, reproducing what is perceived accurately).

Heading: Suspected space localization deficiency

(Cf. Hirschmann & Mészáros, 2021, pp. 174-185): A psychologists' consultation was asked for the 8-year-old girl Viktoria because of her space localization deficiency as suspected by the teacher – her mother herself also identifies certain problems in everyday life, for example when it comes to getting something from a shelf according to a precise description of its location. Yet there are no performance difficulties in any subject. Assessment with the test-battery AID resulted in mainly age-appropriate cognitive abilities, however a very unbalanced performance (sub-) test-profile. There are strengths in everyday knowledge and verbal-acoustic memory. In contrast, there are pronounced weaknesses in visual memory and spatial perception. The established difficulties with repeating numbers backwards may also be related to this, as visual-spatial imagination is required for that task. Furthermore, the impression also arose that Viktoria tends to perceive visual stimuli rather in detail than as a whole. Given an examination by a neurologist – which has not yet been carried out – would not produce a positive result, it is to assess a circumscribed disorder of spatial-constructive functions (ICD-10: F81.9 – Developmental disorders of scholastic skills, unspecified). Then a neuropsychological functional training is to start, to improve the ability to visualize space and visual memory (e.g. visualization exercises, learning perspective representation); in addition, the aim is to develop strategies for dealing with the deficit in terms of compensation.

Heading: Long-term learning difficulties of a child being never taught in the national language

(Dosanj, in print): “The fact that because of his continuing learning difficulties [in literacy and mathematics] the 9-year-old German native speaking Gideon has been already been psychological assessed twice, only with German-language tests, although he has already been taught in English as the language of instruction for five years, made it now seem appropriate to assess him better with English-language tests.” In the English version of the test-battery AID Gideon “showed a below age-expected performance in terms of his ability to solve every day numerical problems.” Apart from this unsurprising result problems have been disclosed when “demands on tactile-kinaesthetic and motor processing as well as spatial perception [are given]. Further, Gideon showed a below age-expected performance when he had to correctly sequence cards related to understanding cause and effect of common real-life situations; and also, when he had to complete a sequence of a visual pattern; both of which pertain to visual discrimination and sequencing. ... In summary, the overall results ... indicate that Gideon fulfils

the symptom criteria for the clinical diagnosis as per ICD 10 (Code F81.2) of a Mathematics Disorder. ... it was highly recommended that this area be focused on in his learning support by using a number of multisensory strategies to help him learn (e.g. ‘verbalization’ or kinaesthetic learning strategies).” (See also Dosanj, 2021).

Heading: Problems in learning German for a refugee whose first language is Arabic

(Cf. Kubinger & Piskernik, 2012, pp. 297-306): An Austria integration center’s teacher, teaching a group of about 20 primarily adult refugees from Yemen in German recommended the youngest member, the 13-year-old boy Halim, to consult a psychologist. Halim’s learning progress was falling behind the other group members more and more and he seemed increasingly absentminded. Because of a lack of any relevant intelligence test-battery with a language appropriate version, the psychologist applied only “manual-visual” tasks without any lexical context of the test-battery AID (which favorably offers optionally non-verbal administration instructions) – of course, this is unsatisfactory from the outset when the cognitive abilities are important for learning a language. Nevertheless, weaknesses to a noticeable extent were identified. These weaknesses relate to a very low information processing speed, a very low ability to understand the functionality of everyday things and a very low ability to understand the sequence of several everyday events. In contrast, his strength proved to be (visual) memory. That is, already without any statement about linguistic-related abilities, Halim had to be assessed as rather low cognitively gifted. Yet during the tests he showed advantageous “attitudes to work”. Because there are hardly any institutional means of support available, the psychologist focused on simple, feasible learning aids, in particular for learning German, which does cognitively not challenge too much: assembling a visual dictionary, reading storybooks with simple texts for children in the first two years of school, and listening to audio books for children.

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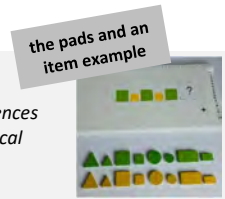
3 The Necessity of Broad Cognitive Ability Measurement

As already mentioned in Subsection 1.3, as many subtests as is pragmatically possible are required in order to shed light on a test taker's cognitive risk factors, protective factors, and developmental-supporting factors. In this Chapter 3, at first each subtest of the test-battery AID 3 (*Adaptive Intelligence Diagnosticum*; Kubinger & Holocher-Benetka, 2023, Kubinger, 2017) is considered separately to show what relevant information could be missed if they were not applied. Second, the focus is on screenings with respect to some *partial performance weaknesses*.

3.1 Risks Associated with Limited Subtest Application

Consider subtest 12 which was not yet included in AID's generations one and two (Kubinger & Wurst, 1985, 2000):

"Subtest 12 *Formal Sequencing* shall measure the ability to perceive regularities and logically consistent dependencies, and to utilise them appropriately. – *Pattern sequences of pads of different colors, shapes and sizes the test taker has to add by the next logical deducible pad.*" (Kubinger, 2017, p. 12).



That is, in former times psychologists had additionally to apply some traditional reasoning test (e.g. some culture-fair test in Cattell's sense), because otherwise the ability to think strictly logically (i.e. the ability of "reasoning") would not have been captured in the psychological assessment. The future will show, whether further reasoning tests should also be integrated into the test-battery AID, because subtest 12 refers (only) to figural contents, but not to lexical ones (see the classification of reasoning tests by Kubinger, 2023a, where there are six categories when crossing *fluid* vs. *crystallized* facets with *lexical* vs. *numerical* vs. *figural* contents).

Speaking of different contents as being of relevance, that is lexical contents (and numerical included) on the one hand, figural on the other, leads to the following: Because there are sub- (and add-on-) tests with "verbal-acoustic" tasks requiring acoustic perception and verbalized acting and also sub- (and add-on-) tests with "manual-visual" tasks requiring visual perception and manual acting, a comparison is possible of a test taker's skills of dealing with words (and numbers) with his/her skills of handling objects and capturing visual figures. Obviously, applying only sub- (and add-on-) tests with "manual-visual" tasks – if a test taker without sufficient language skills (in German and English, respectively) is tested with the non-verbal administration instructions as explicitly offered – will completely miss a test taker's speaking-based thinking. On the other hand, using only sub- (and add-on-) tests with "verbal-acoustic" tasks would mean to miss a test taker's ability to handle objects and to grasp visual forms, as already discussed in Subsection 1.1.