

Lessons From the Kaufman Assessment Battery for Children (K-ABC): Toward a New Cognitive Assessment Model

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When the Kaufman Assessment Battery for Children (K-ABC; A. S. Kaufman & N. L. Kaufman, 1983a, 1983b) was published just over 10 years ago, it had many unique features, including its information processing model and specific recommendations for educational remediation. Although the test has received much attention because of these characteristics, the K-ABC has also been the subject of much controversy. Through consideration of some of these arguments, lessons that researchers in the field of child assessment may learn from the K-ABC and their implications for future directions are identified. Based in part on lessons learned from the K-ABC, an alternative assessment model for the evaluation of children with reading problems is proposed at the end of this article.

The state of child cognitive assessment just over a decade ago was one of both stagnation and altercation. From a scientific perspective, there had been few fundamental changes in either theory or tests since the turn of the century. For instance, then-contemporary IQ tests such as the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1974) and Form L-M of the Stanford-Binet (SB-LM; Terman & Merrill, 1973) had basically the same formats and subtests as their respective progenitors, Binet's original 1905 scale and the 1939 Wechsler-Bellevue (e.g., Sternberg, 1992). From a social perspective, the use of IQ tests for the special education placement of minority children was the subject of many court cases (e.g., Reschley, 1990). It was against this troubled background that the Kaufman Assessment Battery for Children (K-ABC; ages 2 1/2-12 1/2 years; Kaufman & Kaufman, 1983a, 1983b) was published. At the time, many of the K-ABC's features seemed to be direct rejoinders to some of these controversies. For instance, some K-ABC subtests were quite novel compared to those that make up the WISC-R or the SB-LM. Also, the K-ABC is based on specific theoretical models, the application of which are intended to provide more pure estimates of ability versus achievement, identify children who have particular types of information processing deficits, and help psychologists make specific recommendations for educational remediation.

None of the aforementioned characteristics were unique in the early 1980s. Other tests were organized according to specific conceptual models (e.g., Illinois Test of Psycholinguistic Ability; Kirk, McCarthy, & Kirk, 1968) or were intended to assess reasoning rather than acquired knowledge (e.g., Raven's Stan-

dard Progressive Matrices; Raven, 1960), and the special education literature was already replete with theory-based remedial approaches (e.g., perceptual-motor training; Salvia & Hritcko, 1984). The K-ABC was probably the first standardized test, however, for which all of these clinically relevant aims were combined with acceptable psychometric characteristics such as a large, nationally representative normative sample and adequate task reliabilities. That the K-ABC was initially met with considerable professional and mass media attention and seemed to promise new directions for child cognitive assessment is, from this perspective, very understandable.

Despite the test's conspicuous debut, the impact of the K-ABC on the field has been mixed. On the positive side, some of the K-ABC's characteristics have become fairly standard. For example, the Fourth Edition of the Stanford-Binet Intelligence Scale (Thorndike, Hagen, & Sattler, 1986a, 1986b) and a newer test that is currently under development, the Cognitive Assessment System (Das & Naglieri, 1994), are both theory-based tests. Although the Stanford-Binet is not organized according to an information processing model, the Cognitive Assessment System is, and its origins lie in many of the same research and theoretical traditions as the K-ABC. On the other hand, the K-ABC has clearly not displaced the Wechsler scales among psychologists who work with children and instead seems to be viewed as a "specialty" test, such as for preschool, minority, or language-deficient children (e.g., Chaitin & Bracken, 1989; Klausmeier, Mishra, & Maker, 1987).

It is beyond the scope of this article to consider all of the factors that may have affected the scientific and commercial fortunes of the K-ABC. Also, we cannot reasonably review here the total research literature about the K-ABC, which is now quite large and includes numerous studies of special child populations, such as lead poisoning among young children (Dietrich, Succop, Berger, Hammond, & Bornschein, 1990) and children with cognitive impairments (Pueschel, Gallagher, Zartler, & Pezzullo, 1987). Instead, we consider in this article issues raised by the K-ABC's theoretical, interpretive, and remedial models that have implications for future directions in

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child cognitive assessment. Through consideration of these issues, we attempt to identify broader lessons that we as a discipline may take from the example of the K-ABC. Finally, presented at the conclusion of this article is a proposal for an alternative assessment model that in part reflects the lessons that we have learned from the K-ABC.

For readers who may be less knowledgeable about the K-ABC, we can recommend several works besides the test's manuals (Kaufman & Kaufman, 1983a, 1983b). Critiques of the K-ABC are available by Anastasi (1984, 1985), Bracken (1985), Coffman (1985), Conoley (1990), Das (1984), Goetz and Hall (1984), Hopkins and Hodge (1984), Keith (1985), Mehrens (1984), Merz (1984), Page (1985), and Sternberg (1984). Also, Kamphaus and Reynolds (1987) and Kamphaus (1990) summarize numerous areas of research with the K-ABC up to the late 1980s.

Lessons From the K-ABC's Theoretical Models

Before specific controversies and potential lessons are considered, the rationale of the K-ABC's conceptual models is briefly described. Two sets of distinctions about cognitive processes underlie the K-ABC, including ability versus achievement, and, within the latter domain, sequential versus simultaneous processing. Both distinctions had appeared in the literature in various forms long before the K-ABC was published, such as fluid versus crystallized intelligence (Cattell, 1963) and the three-stage arousal, successive-simultaneous, and planning model of Luria (1973), but the Kaufman's subsequent representation of both sets of ideas in a standardized test was novel in 1983. The K-ABC's two main scales, Mental Processing and Achievement, reflect the ability-achievement part of the test's model. The Achievement scale comprises tasks of reading skill (for school-age children) and other subtests that require verbal responses to either pictures (e.g., counting objects and identifying famous people) or questions (solving riddles). The Mental Processing scale is further partitioned into scales of Sequential Processing and Simultaneous Processing. Some subtests of the latter two scales require no spoken response, and the dependence of task performance on prerequisite factual knowledge seems less than for Achievement scale subtests. Sequential and simultaneous processing are generally viewed as coding operations that emphasize (respectively) serial order or concurrent synthesis (e.g., Das, 1973; Das, Kirby, & Jarman, 1975). Real-world activities are not thought to reflect solely one kind of processing, but instead may be more optimally solved using sequential or simultaneous coding. For example, reading unfamiliar words requires an obvious sequential component (phonetic analysis), but rapid recognition of the word thereafter may be based more on visual cues, which may require more simultaneous processing. In the K-ABC's sequential-simultaneous model, achievement problems may result when there is a mismatch between task processing demands and children's relative sequential or simultaneous abilities.

Some issues discussed below are specific to the sequential-simultaneous part of the K-ABC's model, but others have implications beyond this particular theoretical framework. The discussion of each is presented in separate sections.

Lessons Specific to the K-ABC's Sequential-Simultaneous Model

The construct validity of the representation of sequential and simultaneous processing on the K-ABC through its eponymously named scales has been criticized on two essential grounds. The first concerns interpretational confounds among its subtests: All Sequential scale tasks require immediate recall of visual or auditory stimuli, and all Simultaneous scale subtests are composed of visual-spatial stimuli. Thus, poor performance on either scale could indicate processing-related difficulties, poor short-term memory or inattention (sequential), or lack of facility with nonverbal stimuli (simultaneous). Although this criticism was initially based on rational considerations (Das, 1984; Sternberg, 1984), results of numerous subsequent correlational and factor analytic studies are consistent with alternative interpretations of abilities measured by the K-ABC's Sequential and Simultaneous scales (e.g., Gordon, Thomason, & Cooper, 1990; Hendershott, Searight, Hatfield, & Rogers, 1990; Keith & Novak, 1987; Kline, Guilmette, Snyder, & Castellanos, 1994).

A second criticism concerns the K-ABC as a measure of cognitive processing per se. As noted by Sternberg (1984) and Das (1984), the blend of sequential and simultaneous processing applied to a given task may vary across persons. For example, a child could approach a figure drawing task by either "capturing" the whole design before drawing (simultaneous) or by attempting to copy the figure one part at a time (sequential). Although the former approach may be more optimal than the latter, processing type is, in this view, more an attribute of persons than of tasks. Thus, placement of subtests on scales called "sequential" or "simultaneous" by rational or statistical means (e.g., factor analysis) does not ensure that all individuals will use mainly the process indicated by the scale name. By the same argument, subtest scores that only reflect the total number of items passed, as is true with the K-ABC, cannot be interpreted as indicators of a single underlying process.

The aforementioned criticisms may not be specific to the K-ABC but rather seems to be a general problem of the sequential-simultaneous view of cognitive workings. For example, it seems difficult for researchers to construct sequential tasks that do not involve immediate recall of serially presented information or simultaneous tasks that are not based on visual-spatial stimuli. These respective task formats are ideal for the evaluation of order- versus non-order-based processes, but the relative lack of sequential and simultaneous tasks with other presentation modalities creates interpretational confounds (Willis, 1985).

The second criticism mentioned above—the interpretation of task scores as indicators of underlying sequential or simultaneous processes—could be addressed through componential analyses of problem solving strategies (Das, 1984; Sternberg, 1984). It can be very difficult, however, to develop reliable and valid componential scoring models (Sternberg, 1992). Some methods of componential analysis rely on post-test interviews, but young children would have difficulty responding in meaningful ways to such queries. Thus, examiners who test children would need to rely on behavioral indexes of whether a task was

approached in a more sequential or simultaneous way. An example of such a system was discussed by Das (1984), who suggested that the frequency and duration of children's glances at models during a figure drawing task could be recorded along with accuracy scores. Children at the extremes of the frequency-duration scores may be those who use a more simultaneous approach (few glances) or a more sequential strategy (many glances). Of course, the validity of such interpretations would require study. Also, frequency-duration scores more in the middle of the distribution, which may indicate a mix of sequential and simultaneous processing, may have little interpretive value.

It is informative to briefly consider how issues of interpretational confounds and task scoring have been addressed with the Cognitive Assessment System (Das & Naglieri, 1994; ages 5-18 years), which is also in part based on a sequential-simultaneous model. Two subtests of this battery, one from its Successive (i.e., sequential) scale and the other from its Simultaneous scale, appear to involve verbal reasoning to a greater extent than any task from the K-ABC's processing scales. For the successive task, examiners read a sentence and follow it with a question (e.g., *The blue yellowed the brown. Who yellowed?*). For the simultaneous task, children select a picture that matches a description (e.g., *a man behind a boy*). But the successive task still requires immediate recall—the sentence must be remembered—and the simultaneous task still involves visual-spatial stimuli. Other Successive and Simultaneous subtests seem to be more purely memory (e.g., recall of spoken words) or visual-spatial (e.g., figural analogies) tasks. Also, although a componential-type scoring system is being studied for the test's Planning scale, none may be available for the Successive and Simultaneous scales (Naglieri, 1994). Overall, the interpretation of scores from the Cognitive Assessment System from a sequential-simultaneous perspective may not be any less complicated than for the K-ABC.

In our view, it seems that two lessons may be drawn from the aforementioned issues. First, tests that are based on theoretical models about cognitive styles require tasks that are balanced regarding their format and presumed underlying processes. This seems especially difficult to accomplish, however, from a sequential-simultaneous perspective. Second, scoring systems based solely on subtest total scores, characteristic not only of the K-ABC but all contemporary, individually administered cognitive scales, are inadequate for the assessment of styles of reasoning. But the construction of supplemental scoring procedures for componential analyses is also no simple endeavor. Without these two key features, we believe, tests like the K-ABC and the Cognitive Assessment System will fall short of the promise of their processing models: the assessment of *how* children reason. Researchers can either try to incorporate improved tasks and scoring systems into tests like the K-ABC, or they could consider other theoretical models that do not require as many special considerations.

Broader Lessons From the K-ABC's Ability-Achievement Model

This part of the K-ABC's theoretical model concerns an issue for which there has been a long-standing split between research

and practice in child assessment. The most obvious example of this split is the concept of a learning disability, which assumes that ability and achievement can be separately measured. More specifically, children are usually classified as learning disabled based on discrepancies between scores from ability tests like the K-ABC (Mental Processing scale) or Wechsler scales and achievement measures (Frankenberger & Fronzaglio, 1991). In the United States, children so classified are entitled to remedial services under federal law. But children with equally poor scholastic skills who have below-average ability test scores may not qualify for remedial assistance. Such children may be considered slow learners (a colloquial expression) whose achievement is consistent with limited ability. For the same reason—low overall ability—it is also assumed that slow learners are less likely to benefit from intervention than children classified as learning disabled.¹

Unfortunately, the empirical foundations of the aforementioned assumptions are suspect. For instance, correlations between children's ability and achievement measures are typically high (about .70; Sattler, 1988) and tend to increase as children mature, especially for reading skill (e.g., Stanovich, 1986, 1989).² Concerning reading, there is evidence that ability test scores of children who are poor readers may decline over time (e.g., Share & Silva, 1987). This probably occurs because reading problems hinder the development of abilities often measured by IQ scales, such as vocabulary breadth or general verbal reasoning. Finally, the evidence that ability-achievement discrepancies have validity against external criteria such as language arts skills, neuropsychological status, and family history of learning problems is generally negative (Fletcher, Francis, Rourke, Shaywitz, & Shaywitz, 1992; Hurford et al., 1993; Hurford, Schauf, Bunce, Blaich, & Moore, 1994; Pennington, Gilger, Olson, & DeFries, 1992; Siegel, 1992; for an exception, see Kline, Graham, & Lachar, 1993). Glez and López (1994) recently reported similar results among children tested in Spain: IQ scores (from a Spanish version of the WISC-R) failed to predict performance on a lexical decision task (words versus pseudowords); only the children's reading status had predictive validity. Although these studies were not conducted with the K-ABC, their results raise questions about the validity of the learning disabled-slow learner distinction in general.

It is against the background of the issues and empirical findings mentioned above that the K-ABC's model of ability versus achievement must be judged. From this perspective, some features of the K-ABC seem positive. For example, a relatively

¹ Although not discussed here in detail, readers should note that there are also numerous quantitative problems in the determination of "significant" ability-achievement discrepancies, including regression effects, differential test reliabilities, incomparable normative samples, and inflation of Type I error because of multiple comparisons. Although there are statistical means to account for some of these problems (Reynolds, 1984-1985), such adjustments are rarely considered in applied settings.

² There are also objections to ability-achievement distinctions that are based on more conceptual grounds. For example, Sternberg (1984) has argued that acquired knowledge is an inherent part of complex reasoning, and thus a differentiation between the two may be misleading.

novel feature of the K-ABC is the placement of verbal reasoning tasks on its Achievement scale. On more traditional IQ tests like the Wechsler scales, scores from verbal tasks contribute to the overall summary score, which may then be interpreted as an ability index. As mentioned, however, children with reading difficulties may obtain low summary scores because of poor performances on verbal subtests. Thus, their low overall scores may not indicate low ability per se but rather the accumulated effects of limited reading. This potential confound may be less of a concern with the K-ABC. Other aspects of the K-ABC's ability-achievement model are, however, more problematic. For instance, correlations between the K-ABC's Mental Processing and Achievement scales are also about .70 (Kaufman & Kaufman, 1983b, p. 90). Thus, the measurement of ability versus achievement seems no more distinct for the K-ABC than for other IQ and scholastic tests. Also, these observed correlations of .70 probably underestimate the covariances between the latent factors that underlie the K-ABC's Mental Processing and Achievement scales. That is, adjusting these observed correlations for attenuation would yield even higher values, which, from a confirmatory analytic viewpoint, would suggest poor discriminant validity (e.g., Cole, 1987).

We are unaware of studies with the K-ABC in which children with low Achievement scores who have normal versus low Mental Processing scores have been compared across external criteria. Although the K-ABC's Achievement scale provides a rather limited sample of scholastic skills (reading, counting, and general verbal reasoning), such studies would nevertheless provide direct tests of the external validity of ability-achievement discrepancies as represented on the K-ABC. There are numerous studies, however, in which the K-ABC was administered to children classified as learning or reading disabled (e.g., Glutting & Bear, 1989; Heath & Obrzut, 1988; Knight, Baker, & Minder, 1990; Smith, Lyon, Hunter, & Boyd, 1988), but the potential import of these findings is limited. For instance, the sample sizes of many of these studies are small—often less than 50 cases—and no single operational definition of a learning or reading disability was used across all studies. Also, the focus of many of these studies has been the comparison of learning disabled children with those in regular classes, not whether the learning disabled-slow learner distinction itself is legitimate.

The lack of certain types of studies makes it impossible to thoroughly discern the merit of the K-ABC's model of ability versus achievement. Nevertheless, some of the aforementioned criticisms of this distinction per se are applicable to the K-ABC, including high correlations between the test's indexes of ability and achievement and lack of evidence that learning disabled children are really different from other low-achieving children. For these reasons, we would be surprised if the distinction between ability and achievement is less problematic with the K-ABC than with more traditional IQ tests. Also, we believe that the most valuable lesson from all of the issues discussed in this section involves challenges to several long-held assumptions in child assessment. That these assumptions are also deeply rooted in special education policy and law guarantees that changes in testing practices will come slowly, but researchers in the field of child assessment should recognize that many of their ideas about the distinction between ability and achievement and the

discrepancy model of learning disabilities are without solid foundation. The assessment model discussed at the end of this work, which is not based on a distinction between ability and achievement, may represent one alternative to established views about these matters.

Lessons From the K-ABC's Interpretive Model

The interpretive model of the K-ABC is based on scatter analysis. Although scatter analysis of cognitive ability profiles dates to early versions of the Stanford-Binet (Kramer, Henning-Stout, Ullman, & Schnellberg, 1987), modern versions of this practice may be most readily associated with the Kaufmans because of their numerous interpretive guides for tests such as the Wechsler scales (Kaufman, 1979, 1990, 1994), the McCarthy Scales (Kaufman & Kaufman, 1977), and, of course, the K-ABC (Kaufman & Kaufman, 1983b). Briefly described, scatter analysis involves the derivation of hypotheses about children's abilities based on the elevations and shapes of their test profiles. In this view, profile elevation indicates general level of cognitive ability in a normative sense, and ipsative information about relative strengths and weaknesses is indicated by profile shape. Such hypotheses are often listed in interpretive guides (e.g., for the K-ABC; Kaufman & Kaufman, 1983b, pp. 198-205) and reflect assumptions about skills that may be measured jointly by sets of subtests or uniquely by individual tasks. Although some of these hypotheses have empirical bases (e.g., the factor structure of a test), they are more often rationally derived.

Although there is ample evidence that the overall elevations of children's K-ABC profiles covary in expected ways with external criteria such as scholastic achievement, scores from more traditional IQ tests, and diagnoses of mental retardation (e.g., Kamphaus & Reynolds, 1987; Kaufman & Kaufman, 1983b), the same does not seem to be true about other aspects of K-ABC profiles. For example, Glutting, McGrath, Kamphaus, and McDermott (1992) used cluster analysis to identify within the K-ABC's standardization sample core profile types, four of which had flat mean profiles, but the remainder had mean profiles that suggested sequential-simultaneous differences. Although the eight core profile types differed significantly across external measures of achievement and receptive vocabulary, most of the explained variance was due to differences in elevation and not shape (i.e., sequential versus simultaneous). Results of other studies conducted with much smaller samples of normal, referred, or learning disabled children (Das & Mensink, 1989; Kempa, Humphries, & Kerschner, 1988; Kline, Snyder, Guilmette, & Castellanos, 1992, 1993; McRae, 1986) indicate a similar conclusion: The shapes of children's K-ABC profiles are not strongly related to levels of scholastic achievement.

The above types of findings are not unique to the K-ABC. For example, results of numerous studies conducted with the Stanford-Binet and Wechsler scales also indicate that profile shape is not reliably associated with status on external variables such as achievement or special education placement (e.g., Hale & Saxe, 1983; Kline et al., 1992, 1993; Kramer et al., 1987; McDermott, Fantuzzo, & Glutting, 1990). The only clear exception concerns ability profiles with uniformly low scores on verbal tasks. Children who obtain such profiles are at risk for

poor school performance (e.g., Kline et al., 1992; Richman & Lindgren, 1980), but this observation is hardly a revelation: School success obviously requires adequate language-related skills.

More interesting is the continued practice of the interpretation of the shapes of cognitive ability profiles from the K-ABC or other tests in the face of such negative empirical evidence. We have speculated elsewhere (Kline et al., 1993) that the intuitive and clinically sensible nature of scatter analysis may make it very resistant to disconfirmation, much like illusory correlations (Chapman & Chapman, 1969). Also, a type of partial reinforcement effect may be operating. That is, psychological examiners may occasionally encounter a child whose ability profile happens to correspond with external correlates in a way consistent with a scatter analysis view. For example, a particular child with poor social skills may coincidentally have very low scores on the Picture Arrangement and Comprehension subtests of a Wechsler scale, although results based on group data do not suggest a strong relation (Lipsitz, Dworkin, & Erlenmeyer-Kimling, 1993). Such periodic "confirmation" experiences may operate to maintain enthusiasm for scatter analysis through more numerous disconfirmation episodes.

Apart from our musings about factors that may maintain a clinical practice of questionable validity, we believe that one of the most valuable lessons of the K-ABC is the highlighting of the shortcomings of how practitioners routinely interpret scores from cognitive ability tests. Although test authors might be able to construct subtests with psychometric properties more suitable for scatter analyses (e.g., increase task length to improve reliability), we are sceptical about this possibility. That is, we as a discipline have pursued scatter analyses in different forms—including various "Binet-o-grams" for the Stanford-Binet and diagnostic indicators for Wechsler scales (e.g., the "hold-don't hold" indicator of brain damage; the ACID profile [Arithmetic, Coding, Information, and Digit Span] for learning disabilities)—for about 75 years with little success. It is time to move on. One option is to develop assessment models that are based more on broadband cognitive domains and related interpretive strategies in which subtest scores play a much smaller role. These characteristics are part of the alternative assessment model we will describe at the end of this article.

Lessons From the K-ABC's Remedial Model

The K-ABC's model for remediation—the recommendation of sequential- or simultaneous-based teaching techniques to capitalize on children's processing strengths (Kaufman & Kaufman, 1983b)—reflects a long-standing goal in psychology and education: matching instruction to learning styles (e.g., Aptitude \times Treatment Interactions; Cronbach, 1957). Although this part of the K-ABC is perhaps its most intriguing, unfortunately, there has been little research in this area. We could find only one published study in which the K-ABC's remedial model was directly evaluated. Fisher, Jenkins, Bancroft, and Kraft (1988) administered the K-ABC to 42 poor readers and classified them into sequential, simultaneous, or mixed groups. Children in the first two groups had Sequential and Simultaneous

scores that differed by at least 12 points, which corresponds to the .05 significance level. Each child was then individually taught word recognition skills using the sequential, simultaneous, and mixed teaching methods outlined in the K-ABC's *Interpretive Manual* (Kaufman & Kaufman, 1983b). There were no significant main effects (K-ABC profile type and teaching strategy) or interaction effects on the dependent variable of word task performance.

A few other studies are less directly related to the K-ABC remedial model because they concern the relations of children's test scores to performance on novel learning tasks. For example, Ayres and Cooley (1986) and Ayres, Cooley, and Severson (1988) administered tasks to children that required them to remember associations between numbers and abstract symbols. These tasks were devised as sequential and simultaneous ones in that recall order was essential for one task but not the other. In both studies, children's Sequential and Simultaneous scores from the K-ABC were unrelated to their scores on the similarly named learning tasks.

Although the absence of empirical studies about the K-ABC's remedial model is disappointing, such studies are very difficult to conduct. Researchers would need relatively large groups of children who have distinct types of K-ABC profiles, who in turn are given different types of instruction in various scholastic skills. Such studies should also be longitudinal in order to monitor the progress of children over time. Whether such studies will be performed with the K-ABC's remedial model remains to be seen, but the larger goal of fitting teaching methods to children's specific cognitive strengths and weaknesses is still important. If any general lesson can be gleaned from this part of the K-ABC's conceptual base, it would be that any model of child cognitive assessment should address this issue. At the least, specific skills that are the targets of remediation should be identified, as well as instructional methods that may improve such skills.

A Resume of Lessons From the K-ABC

To summarize, the areas in which the K-ABC may serve as a positive example for the discipline include the clear articulation of theoretical and empirical rationales; the intention to assess cognitive skills that are directly relevant for school achievement; the incorporation of tasks from the experimental and cognitive literatures that provide more modern alternatives to those found on traditional IQ tests; and psychometric characteristics that are, on the whole, satisfactory. Problems with the K-ABC suggest many potential lessons, including the need to develop tasks and scoring systems that fully meet the special assumptions of particular theoretical models and the need to critically examine practices of test interpretation that are very common but of dubious validity, such as the scatter analysis of IQ profiles and a belief that IQ scores reflect ability as distinct from achievement. From this starting point, we next present suggestions for new directions in child cognitive assessment.

Proposal for an Alternative Assessment Model

Various suggestions for alternatives to the "standard" IQ-achievement test battery have appeared in literature including,

for example, portfolio assessment and componential analysis of problem solving, but many have psychometric shortcomings (e.g., low interrater reliability), cannot match the external validity of global IQ scores against achievement, or have little external validity after IQ scores are partialled out (e.g., Sternberg, 1992). The assessment model proposed here is based on recent findings reported in the psychological and educational literature, some of which suggest that these problems can be overcome in the search for an alternative assessment model.

The following discussion is presented in two main parts. The first concerns recommendations for a reduced role for tests of general cognitive ability like the K-ABC, the Wechsler scales, and the Stanford-Binet. Presented in the second section are suggestions for the assessment of specific cognitive skills that (a) are not directly measured by traditional IQ tests and (b) may be more directly relevant for school achievement than the very global capabilities measured by IQ scales. More specifically, the alternative model discussed below concerns the approximately 10% of school-age children who have difficulties with reading and language arts.³ Not all children referred to psychologists because of achievement problems are poor readers, but most are, and poor readers make up the large majority of students who eventually receive academically oriented remedial services (e.g., Norman & Zigmond, 1980).

A Reduced Role for IQ Tests

There can little doubt that the general verbal, visual-spatial, and memory skills measured by tests such as the K-ABC, the Wechsler scales, or the Stanford-Binet are factors in school success. But the estimation of very general, broadband competencies may be the only real value of IQ tests. Certainly, very low IQ scores indicate high risk for poor scholastic performance and possible cognitive or developmental disorders, such as mental retardation. Likewise, very high IQ scores may evince the capability to benefit from an accelerated academic program. Between these two extremes, however, the potential value of the information provided by IQ tests is very limited for perhaps most children for reasons already reviewed. Kaufman (1994) reported that Wechsler once said: "My scales are meant for people with average or near-average intelligence, clinical patients who score between 70 and 130." Many of the research results cited earlier, however, suggest just the opposite: IQ test results may be least informative for children who score more or less in the normal range.

Considering the aforementioned issues, we propose that the main role of IQ scales should be to rule-out gross cognitive impairment among children referred because of poor achievement. Accordingly, the interpretive focus should be on broadband summary scores and not on subtest scores. Furthermore, it may not be necessary to routinely give an IQ test to every referred child or even to administer a whole battery. Short forms of IQ tests that are made up of only a few (e.g., two or three) subtests usually have mediocre overall reliabilities, but longer abbreviated batteries have more acceptable psychometric properties. For example, the lowest reliability coefficient of the six-subtest, general purpose abbreviated battery for the Fourth Edition Stanford-Binet is .95 (Thorndike et al., 1987b, p. 50);

the reliabilities of various five-subtest short forms of the WISC-III are comparably high (Sattler, 1992, p. 1170).⁴ Of course, administration of a whole IQ scale yields even greater precision, but there is a point of diminishing returns beyond a psychometrically appropriate short form.

Another way the role of IQ tests should be reduced is to abandon the discrepancy model of learning disabilities. We make this recommendation in the spirit of the increasing recognition in our discipline of the importance of teaching empirically valid procedures, but we also appreciate its difficulty. That is, the discrepancy model has become institutionalized in North America in the form of federal, state, and provincial laws; school policies; and simple inertia in our testing and placement practices. Although we genuinely do not question whether there are children with learning disabilities, we do not believe that the "standard" IQ-achievement test battery plus discrepancy definitions are suitable means to identify such children. The challenge of entrenched practice through the development of alternative assessment models is always difficult, but the allocation of limited remedial resources should not continue to be based on such weak empirical foundations.

Assessment of Specific Cognitive Skills

The conceptual core of the model proposed in this section concerns the assessment of two sets of skills that are probably central to the attainment of proficient reading: phonological processing and listening comprehension. It is obviously beyond the scope of this article to comprehensively consider the large number of empirical studies and theoretically oriented articles about these two domains. Instead, we attempt to summarize enough of these works to provide readers with a basic overview. Also, we emphasize below possible implications of results from studies of phonological processing and listening comprehension for applied assessment.

Phonological processing. This refers to a cluster of abilities that include awareness of and access to the sounds of one's own language; the representation of phonological units in working memory during ongoing processing, such as when young readers encounter an unfamiliar word; and the retrieval of letters, words, or word segments from long-term memory (Wagner & Torgesen, 1987). A variety of tasks have been used to measure phonological-related skills including, for instance, ones that involve the blending, isolation, or substitution of words or sounds (e.g., saying words with the sound of the first letter deleted); the immediate recall of words that differ in their phonetic composition; the rapid or serial naming of objects or numbers; and the differentiation between real words and nonsense syllables. Most of these types of tasks have been used in experimental studies

³ We are intentionally avoiding use of the term *dyslexia*, which may imply a discrepancy between IQ and reading achievement scores.

⁴ The six-subtest abbreviated battery for the Stanford-Binet includes Vocabulary, Comprehension, Memory for Sentences, Bead Memory, Pattern Analysis, and Quantitative. The five-subtest short forms of the WISC-III listed by Sattler (1988) include a minimum of three Verbal scale subtests, which seems appropriate considering the importance of overall language skills for school performance.

and thus are not standardized or normed. A recent exception includes the Test of Phonological Awareness (TOPA; Torgesen & Bryant, 1994), which is a 20-item screening measure for children ages 5–9 years old. The picture-based TOPA is available in two forms (Kindergarten and Early Elementary), consists of 20 items that require the determination of whether beginning or ending sounds of words are different, and has a large normative sample (over 4,500 cases).

Although it seems obvious that the ability to analyze and synthesize the components of words and sounds would be an essential part of learning to read, several converging lines of research and theory suggest the potential diagnostic value of phonological-oriented assessment. For example, it is becoming increasingly clear that the primary deficit among poor readers is phonological rather than visual–spatial (e.g., Mann & Brady, 1988; Rack, Snowling, & Olson, 1992; Richardson, 1992). Visual–spatial ability of the type measured by traditional IQ tests has modest validity for kindergarten children against their letter recognition skills in Grade 1, but its predictive power declines markedly thereafter as reading becomes more linguistic (e.g., Solan, Mozlin, & Rumpf, 1985).⁵ Thus, deficient phonological processing seems to be a core characteristic of poor readers regardless of their IQ levels (e.g., Siegel, 1988, 1992). Furthermore, the results of numerous studies suggest that (a) the phonological skills of children as young as five years of age have predictive validity against later reading success, (b) children who will later have problems with reading can be identified with reasonable accuracy based on their phonological skills in kindergarten, and (c) phonological measures have predictive validity even when IQ scores are partialled-out (e.g., Hurford et al. 1993; Mann, 1993; Sawyer, 1992; Wagner, 1988). Finally, there is evidence for at least moderate success of phonological-based training as a means to improve children's word identification skills (e.g., Hurford, Johnston, et al., 1994; Wagner & Torgesen, 1987).

Results of recent cross-sectional and longitudinal studies by Wagner, Torgesen, Laughon, Simmons, and Rashotte (1993) and Wagner, Torgesen, and Rashotte (1994) provide some useful leads toward the construction of a comprehensive test of phonological processing. These researchers evaluated various latent variable factor models and selected one with four interrelated processes, including analysis (e.g., sound isolation), synthesis (e.g., blending phonemes), working memory (e.g., memory for sentences), and naming (e.g., isolated and serial naming of letters). In Wagner et al.'s (1994) longitudinal study, the factor structures at kindergarten and Grade 2 were very similar with high test–retest correlations, which suggests stable individual differences. Wagner et al. (1994) also reported evidence for reciprocal effects between phonological processing and reading skill, but the effects of prior phonological processing on subsequent reading were stronger than the reverse.

Listening comprehension. The second set of specific cognitive skills that could be assessed by an alternative assessment battery includes listening comprehension, which refers to a child's ability to understand spoken speech, either relatively unstructured, natural language or speech that is organized more like text (e.g., a story read aloud). Listening comprehension is obviously a component of IQ scales—task directions must be

understood—but this ability per se is not directly measured by them. There are other types of measures, however, such as the Test for Auditory Comprehension of Language–Revised (TACL-R; Carrow-Woolfolk, 1985) or oral administration of reading comprehension tests (e.g., Aaron, 1991), that may more explicitly reflect listening comprehension.

It is not surprising that poor listening comprehension would be associated with reading problems, but more interesting are the following two points: First, the combination of information about phonological processing and listening comprehension together account for about 50–75% of the variance in children's reading skills (Aaron, 1991; Stanovich, 1986; Wood, Buckhalt, & Tomlin, 1988), which seems to be greater than the predictive power of either alone. The total predictive power of both sets of skills also matches that of IQ scores. Second, differences between children's phonological processing and listening comprehension abilities may be more diagnostically useful than IQ–achievement discrepancies. For example, poor reading in the presence of normal listening comprehension may indicate a relatively discrete, “vertical” deficit (i.e., in phonological processing). Poor readers who have weaknesses in both phonological processing and listening comprehension may have broader, “horizontal” problems (Stanovich, 1991). These types of children may require different levels of remedial help. For example, children with more discrete deficiencies may benefit from specific phonetic-based training, but children with broader language weaknesses may require additional help with reading comprehension and general language use and vocabulary development. Accordingly, Stanovich (1991) also suggested that discrepancies between estimates of children's phonological processing and listening comprehension abilities may have greater diagnostic value than IQ–achievement discrepancies.

Integrated Assessment Model

Presented in Figure 1 is a graphical depiction of the association between the aforementioned specific domains of phonological processing and listening comprehension, the general abilities measured by IQ tests, and children's reading achievement. We believe that children's success in early reading instruction is affected by all three types of abilities, and the two-way arrows at the left of the figure reflect the presumption that these areas are intercorrelated. Such intercorrelations, however, do not rule out modular deficits, such as deficient phonological processing in a child with normal listening comprehension and general verbal, visual–spatial, and memory skills. At the onset of formal reading instruction (middle of the figure), we believe that IQ scores reflect basically the same cognitive processes that contribute to mastery of early reading skills such as letter recognition and sound–symbol associations. As children progress through school, however, their reading skills subsequently affect their performances on so-called tests of ability like the K-ABC

⁵ There are children who have genuine visual–spatial deficits (e.g., Rourke, 1989) or who have normal phonetic skills but poor reading comprehension (e.g., “word callers”), but such children probably make up a small minority of poor readers.

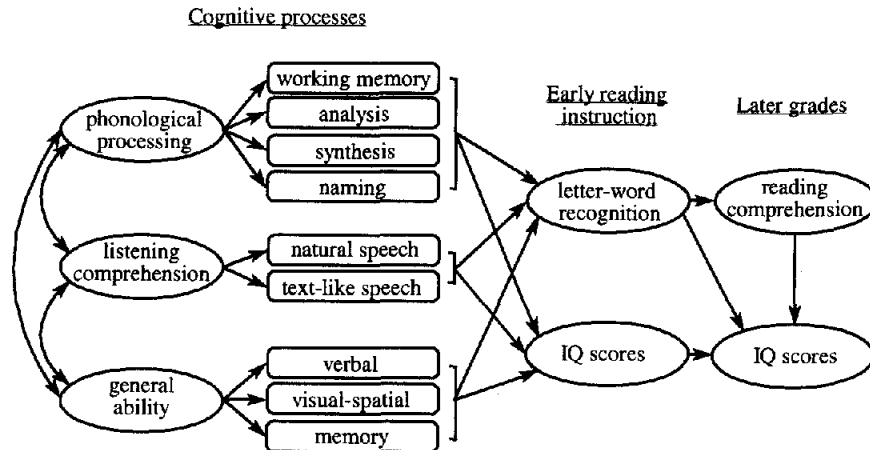


Figure 1. Conceptual representation of the alternative assessment model for children who are poor readers.

or Wechsler scales. Thus, we believe the distinction between “ability” and “achievement” becomes less meaningful over time.

We believe that it is possible to construct subtests based on the conceptual model outlined in Figure 1 that together may be more useful than the “standard” IQ-achievement test battery. The cognitive processes outlined in the figure seem to be directly relevant to reading skill, and their representation in a test battery would not seem to require the special scoring requirements of tests based on a sequential-simultaneous model. Also, the internal consistencies of tasks of phonological processing and listening comprehension generally range from .70 to .90 (e.g., Carrow-Woolfolk, 1985; Wagner et al., 1993, 1994), which compares favorably with the reliabilities of subtests from IQ scales. Although phonological processing tasks in particular would require norms, all of these characteristics seem to bode well for the construction of test batteries that might correspond to the model presented in Figure 1.

In considering any alternative assessment model, however, we as a discipline should be cautious not to repeat previous mistakes. For example, subtest scores should not be interpreted as they are in scatter analyses of IQ profiles. Instead, we recommend that subtests be viewed as are observed variables in the technique of confirmatory factor analysis: fallible (not perfectly reliable) means to measure underlying abilities that are not expressed in a single, direct way. Thus, the lowest level of profile analysis, if conducted at all, should concern scale or composite scores. A second mistake that researchers should not repeat is an unseeing reliance on discrepancy scores. Possible diagnostic implications of differences between children’s phonological processing and listening comprehension skills were mentioned, but the external validity of such discrepancies should be carefully studied before they are routinely interpreted. Also, the host of statistical complications that arise when two scores are compared—regression effects, differential reliabilities, etc.—should not be ignored as is often true with IQ-achievement discrepancies.

To conclude this section, we would like to highlight some lim-

itations of the alternative assessment model we have proposed. This model is oriented toward reading problems in the early elementary years that concern decoding (i.e., word recognition) and comprehension. Of course, some children have achievement problems in other areas, including arithmetic and written expression. For older school children, the latter skill in particular becomes increasingly important. Thus, other types of achievement difficulties may require their own distinct conceptual models. Although this is a demanding task, the development of more tailored assessment models would move us as a discipline away from using the one-size-does-not-fit-all “standard” IQ-achievement battery for referred children. The alternative model outlined here is also of little value for children who may be mentally retarded, for whom standard, full-battery IQ tests would be more suitable.

Summary

We agree with the overall assessment of the K-ABC expressed by Das (1984): The most important contribution of the K-ABC may not be the test itself but rather the lessons that it offers. This is not to say that the K-ABC is not a sound, viable alternative to other general cognitive measures for children. It is, but the K-ABC is not as radically different from more traditional IQ scales as it seemed 10 years ago. Nevertheless, signposts along a journey are indispensable, and we think that those in the discipline of child assessment could benefit by following some of the directions indicated by the K-ABC.

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Received December 12, 1994

Revision received June 3, 1995

Accepted June 8, 1995 ■

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