The International Journal of Indian Psychology
ISSN 2348-5396 (Online) | ISSN: 2349-3429 (Print)
Volume 12, Issue 2, April- June, 2024
DIP: 18.01.002.20241202, DOI: 10.25215/1202.002
https://www.ijip.in

Research Paper

Test Form, Gender and Intellectual Performance in the Original and Adapted Terman-Cesselin Tests for Pupils in Ivory Coast

Franck Gustave KOFFI[1]*, Hassan Guy Roger TIEFFI[2], Bi Tra Grégoire GALA[3], Kouassi Romain KOUADIO[4]

ABSTRACT

The aim of the study was to examine the influence of different forms of a psychological test on the intellectual performance of Ivorian pupils of different sexes. Sixty pupils, including thirty (30) boys and thirty (30) girls from the same CM1 (Cours Moyen 1re Année) class aged between 8 and 14, took part in the study. The relevance of the adaptations made was measured using two intelligence tests, the Terman-Cesselin (original test) and the Terman-Cesselin Afrique (adapted test). The results obtained using SPSS 20.0 software showed that adapting the Terman Cesselin to the Ivorian environment had a real impact on pupils' intellectual performance. They also show that the intellectual performance of girls on the adapted Terman Cesselin is higher than that of boys on the original Terman Cesselin. This information could help test practitioners in their choice of assessment instruments for the pupils in their care.

Keywords: *Adaptation, Terman Cesselin, Sex, Version of A Psychological Test, Original Test, Adapted Test*

Problematic

The widespread use of psychological tests throughout the world has led the designers of these instruments for assessing mental processes to produce them not only in all fields, but also in all languages and cultures. Since the design of the first intelligence test, the Binet-Simon in 1905, psychological tests have tended to be Anglo-Saxon in origin (Wechsler, 2014), both in the material used (test support, pictorial representations, instructions, etc.) and in the wording of the items (Grégoire, 2021). These tests are often not adapted to certain cultures, including African culture (International Catholic Child Bureau, 1959).

The specific nature of the African context has led researchers and designers of psychological tests to devise culture-free or culture-fair tests. Culture free" tests are tests that are independent

[1]Assistant, Ivorian Centre for Studies and Research in Applied Psychology (CIERPA) & Félix Houphouët BOIGNY University of Abidjan Cocody
[2]Associate Professor, Ivorian Centre for Studies and Research in Applied Psychology (CIERPA) & Félix Houphouët BOIGNY University of Abidjan Cocody
[3]Doctoral Student in Psychology, Félix Houphouët BOIGNY University of Abidjan Cocody
[4]Counselling Psychologist
*Corresponding Author

Received: January 12, 2024; Revision Received: April 07, 2024; Accepted: April 12, 2024

of any cultural factor, whereas "culture fair" tests are tests that are adapted to everyday life and are specific to the culture being measured. Obtaining culture free or culture fair tests is based on a complex adaptation process carried out in African contexts. The adaptation process refers to all the activities involved in transposing a psychometric test from one language and/or culture to another (Hambleton et al., 2005). These activities aim not only to determine whether the construct exists in the target culture, and to produce a translation, if necessary, but also to ensure equivalence between this translation and the original test (Angel, 2013). The adaptation process therefore refers to the passage from the original version of a psychometric test (VO) to an adapted version (VA) via one or more translated versions (VT). The translated version becomes the adapted version when the adaptation process is complete (René de Cotret, 2019).

Several psychological tests, notably Muray's T.A.T. and the Terman-Merrill, have been adapted to the African context (Moreigne & Senecal, 1962; Ombredane, 1969). For example, with the (L)-form of the Terman-Merrill, the images and certain questions have been modified or borrowed from the M-form to better suit the African population. However, the adaptations made always seem to be inconclusive, highlighting the issues of identifying measurement bias or comparing the scores of individuals from different cultures, as well as the methodology for adapting tests in different languages and cultures.

In order to verify the impact of adaptations of psychological tests on intellectual performance in populations living in Africa, numerous studies have been carried out in cognitive psychology and psychometrics. Research in the various fields indicates that the production of a score on a psychological test is a function of the form of the test (Gregoire, 2021; Kouadio, 2020; Lacavalier & Tasser, 2001, René de Cotret, 2019) and the gender (Moreigne & Senecal, 1962; Suwartono, 2014) of the individuals assessed.

With reference to the above-mentioned studies, it emerges that the version or form of the psychological test (original vs adapted) and the sex of the individuals have an isolated influence on cognitive functioning by inducing multiple changes in the participants subjected to the intelligence tests. These changes can be seen directly in the intellectual performance of the subjects tested.

With this in mind, we propose to study the combined influence of the version/form of the psychological test and gender on the intellectual performance of Ivorian pupils. In order to achieve this objective, the following hypotheses were formulated. The average intellectual performance of Ivorian pupils on the adapted Terman Cesselin is higher than their intellectual performance on the original Terman Cesselin (HO1). When the Ivorian pupils were given the Original Terman Cesselin, the average intellectual performance of the female pupils was higher than that of the male pupils (HO2). When Ivorian pupils were given the Terman Cesselin Original, the average intellectual performance of female pupils was higher than that of male pupils (HO3). When the girls were given the adapted Terman Cesselin, their average intellectual performance was higher than that of the boys given the Original Terman Cesselin (HO4).

METHODS

Characterising variables

he variables under study are twofold: firstly, the form of the psychology test and gender, which represent the independent variables, and secondly, intellectual performance, which characterises the dependent variable.

The form of a psychological test refers to the final product, the definitive version of the test at the time it is used. Thus, the form of the test is a qualitative variable with two modalities: original form and adapted form. The original form of a test refers to the test in its originality, in its very birth, in its conception. It is the very first and only of its kind. The adapted form of a test refers to all the changes made to the original test when it is transferred to a different population, a different culture. An adapted test is therefore a different or modified version of an original test. Sex refers to all the observable biological traits that distinguish human beings. It has two meanings: boys and girls. According to Koffi (2017), intellectual performance represents the total score obtained by an individual after taking an intelligence test and is quantitative in nature.

Participants

The sample consisted of 60 pupils from the EPP Port Bouet 2 primary school in the commune of Yopougon in Abidjan (Côte d'Ivoire). It comprised 30 boys and 30 girls from the same CM1 (Middle Years 1 and 2) class, aged between 8 and 14.

Material and procedure

The study is based on two instruments: the original ***Terman-Cesselin*** *and* ***The Terman-Cesselin Afrique***

1. **The Terman-Cesselin (original test)** is one of the Binet-Simon type tests which still follow the foundations used in the first metric scale of intelligence devised in 1905 by Alfred Binet and Theodore Simon. Its validity criterion is academic success. The Terman-Cesselin is an intelligence test designed in 1968. It is derived from the French Terman-Merrill, which is a revised and published version. It is also much more widely calibrated. The Terman-Merrill has 129 items. Above the age of 5, the level of the tests is established by half-year, which increases the precision of the instrument. In terms of content, there are geometric and figurative tests, inductive reasoning tests, comprehension tests and tests for understanding social and mathematical problems.
2. **The Terman-Cesselin Afrique** is an adaptation of the reworked version of Terman-Cesselin published in 1976 by the same author. It also includes 129 tests. Unlike the original test, some of the images, text, proofs and figures have been modified. In this study, we used nine (09) items from the original Terman-Cesselin and their adaptation in the Terman-Cesselin Afrique. These nine items were selected on the basis of the instructions in the original test booklet and the age considered for pupils in regular classes in Cours Moyen 1ière année (CM1), i.e. 10 years old if we consider that the reference school age for the start of primary school in Côte d'Ivoire is six (06) years old. So, we made a selection of tests starting two (02) below the age of ten (10). That is to say eight (08) years up to fourteen (14) years. The aim of this approach is to take into account pupils who may be behind in terms of the mental level required for the age of 10, i.e. below the tests for 10-year-olds, and pupils who may be ahead. The nine (09) tests concerned comprehension, nonsense sentences, matching analogues, remembering drawings, similarities and differences, finding reasons or reasoning, completing sentences, messy sentences and nonsense pictures.

The scoring of the data obtained is based on the standard scoring tables and any information contained in the booklets, but unlike the original tests, we assign scores (numbers) to each right or wrong answer and not + or - as expected. Thus, each child has a score that represents their intellectual performance. The two tests were administered over three days.

RESULTS

The results are presented in the order in which the hypotheses were formulated. To test operational hypothesis H1, the intellectual performance of Ivorian pupils in the Original Terman Cesselin was compared to their intellectual performance in the Adapted Terman Cesselin. The mean (M), number (N), standard deviation and significance level (p) are shown in Table 1.

Table 1: Table showing the intellectual performance of Ivorian students in the original and adapted Terman Cesselin tests.

Terman Cesselin	Mean	Headcount	Déviation	Significance
Test Original	11,57	15	3,72	p < .05
Test adapted	20,83	15	4,19	

The use of Student's t in the case of independent samples indicates the existence of a significant difference between the intellectual performance of Ivorian pupils in the Original and Adapted Terman Cesselin ($t = 9.06$, at 2 ddl. $p < .005$). H01 is therefore confirmed. This means that the intellectual performance of Ivorian pupils subjected to the Terman Cesselin Adapté/Afrique is higher than the intellectual performance of Ivorian pupils subjected to the Terman Cesselin Original. This result underlines the importance of adapting the test in order to develop a pupil's potential.

To test operational hypothesis 2, the intellectual performance of boys was compared with that of girls in the original Terman Cesselin. The mean (M), number (N), standard deviation and significance level (p) are shown in Table 2.

Table 2: Table showing the intellectual performance of boys and girls in the original Terman Cesselin test

Terman Cesselin	Sex	Means	Headcount	Deviation	significance
Test Original	Girls	18,13	15	6,81	p >.05
	Boys	14,27	15	4,65	

Statistical analysis shows that the difference between girls' and boys' averages on the original Test is significant ($t = 2.56$ at 2 ddl. $p < .005$). Hypothesis H02 is not confirmed, i.e. the intellectual performance of female students is higher than the intellectual performance of male students in the original Terman-Cesselin.

To test operational hypothesis 3, the intellectual performance of the boys was compared with that of the girls in the adapted Terman Cesselin. The mean (M), number (N), standard deviation and significance level (p) are shown in Table 3.

Table 3: Table showing the intellectual performance of boys and girls in the adapted Terman Cesselin test

Terman Cesselin	Sex	Mean	Headcount	Deviation	significance
Test adapted	Girls	23,33	15	2,35	p < .05
	Boys	18,33	15	4,19	

Statistical analysis of these data reveals the existence of significant differences between boys and girls ($t = 4.06$, at 2 ddl. $p < .05$) in terms of their intellectual performance on the adapted Terman Cesselin. H03 is confirmed. This result indicates that the intellectual performance of female pupils in the Adapted Terman Cesselin is higher than the intellectual performance of male pupils subjected to the same test. This result, which is a good indicator of the difference between girls and boys, underlines the existence of a real impact of the adaptation of this test on gender.

With regard to interactive operational hypothesis 4, the intellectual performance of boys subjected to the Adapted Terman Cesselin was compared to the intellectual performance of girls subjected to the original Terman Cesselin. The mean (M), number (N), standard deviation and significance level (p) are shown in Table 4.

Table 4: Table showing the intellectual performances produced by the boys in the adapted Terman Cesselin and those of the girls in the original Terman Cesselin.

Sex &Terman Cesselin	Means	Headcount	Deviation	Significance
Girls, Terman Cesselin Adapted	23,33	15	4,17	$p < .05$
Boys, Terman Cesselin Original	10,20	15	1,97	

The calculated $t = 11.03$, significant at $P < .001$. The average intellectual performance of female pupils subjected to the Adapted Terman Cesselin was higher than the average intellectual performance of male pupils subjected to the Original Terman Cesselin. In other words, gender and the form of the Terman Cesselin (original vs adapted) have a significant combined effect on the intellectual performance of the pupils. Operational hypothesis H04 is confirmed.

DISCUSSION

The above results can be interpreted in the light of the theoretical concepts of Bruner (1997), Theios (1975), Carroll-Horn-Cattell (1993) and the types of adaptation and bias of Van de Vijver (2004). How then are we to understand the differences in intellectual performance produced by Ivorian pupils subjected to the original Terman Cesselin and its version adapted in Ivory Coast?

To answer this question, we draw on the theoretical concepts of Bruner (op.ci), Carroll-Horn-Cattell (1993) and Theios (1975). Indeed, the production of a score on an intelligence test relies on the convocation of numerous cultural facts (Bruner (1997) and involves several cognitive processes such as information processing processes and the degree of familiarity with the task (Koffi, 2017, 2020). Based on these different theories, we learn that the development of intelligence in children is inseparable from culture. This development responds to a concern for socialisation, and it is in this context that the individual's cognition develops. So, for example, the African child is built through environmental and social characteristics, in particular the pictorial representations, symbols and other lexicons specific to his or her culture. During a test session, the African child, like other children around the world, develops particular attitudes to the task at hand. This involves receiving information through the sense organs and coding it in a language that can be transmitted and processed by the central nervous system (input), then comparing the information received with other coded internal signals present in the memory to facilitate recognition.

After these stages, the African child looks in memory for the global response associated with the situation and proceeds to draw up a programme of action to give his definitive response

(output). Familiarity with one form of test in relation to another would lie in the fact that the Ivorian pupil would recognise and understand the elements favoured in the construction of the Terman-Cesselin Afrique, i.e. codes, colours, pictorial representations, lexicon (sentences), etc. In other words, the Ivorian pupil would recognise and understand the elements favoured in the construction of the Terman-Cesselin Afrique. In other words, pupils in Côte d'Ivoire use their crystallised intelligence (Carroll-Horn-Cattell, 1993). As a result, they mobilise all their attentional resources by developing the right attitudes to the problems presented to them. They would understand the instructions given by Terman-Cesselin Africa and the examples that call on the laws of mathematical logic, understanding of social problems and the various analogies proposed. He then actively retains these laws in his memory, consolidates them and establishes a relationship between the different items in the examples and the new items in the test itself. After these mental operations, the Ivorian pupil, who is familiar with the constituent elements of the test, selects the law he should use first and the one he should put aside for the moment to give the appropriate answer. This enables them to perform well in the adapted test.

Conversely, when the Ivorian pupil is not used to the constituent elements of the test submitted to him, in particular the original Terman-Cesselin, he would have difficulty comparing the information received with the other coded internal signs present in memory to facilitate recognition. As a result, Ivorian pupils unfamiliar with the original Terman-Cesselin would have difficulty understanding absurd sentences, opposing analogies, counting and disordered sentences and the absurd images proposed. All of which would result in a poor performance in the original Terman-Cesselin.

Another explanation for the difference in intellectual performance on the original Terman-Cesselin and Terman-Cesselin Afrique tests, a difference in favour of the Terman-Cesselin Afrique, would lie in the quality of the adaptation carried out (Van de Vijver, 2004). Indeed, the adaptation of a test emphasises the different validities (theoretical and predictive). This means that the concepts assessed in the target culture must be known and measured by the adaptor in order to avoid measurement and interpretation errors. This involves controlling construction bias and method bias. With regard to the control of construction bias, Van de Vijver (op. cit) helps us to understand that there is no construction bias insofar as the adapted test actually measures what it is supposed to measure, for example, in the comprehension test, the comprehension ability derived from Ivorian culture. As a result, Ivorian students easily understand what is required of them, the meaning of the tests and produce good intellectual performances in the Terman-Cesselin Afrique.

As far as method bias is concerned, it should be noted that this refers to the interaction between the stimuli or items in the test, its administration to the subjects and the administrator-administer interaction, etc. Method bias focuses on the familiarity, correspondence or acquiescence of the subject's culture to the test culture, in terms of response formats, item presentation, test-taking conditions, etc. In our context, the successful adaptation of the original test leads Ivorian pupils to feel at ease with the tests or the administration of the tests. As a result, students taking the Terman-Cesselin Afrique produced better results than those taking the original Terman Cesselin.

Through these results, the study identifies the form of the Terman-Cesselin test (original vs adapted) and gender as variables that have a real impact on pupils' intellectual performance, and thus corroborates previous studies explaining differences in intellectual performance by cultural factors, in particular the form that the test takes at the time of its administration on

cognitive performance (Grégoire, 2021; Kouadio, 2020; René de Cotre, 2019). The results of this study are also in line with the work of Suwardono (2014) and Kimura (2004), who indicate that girls perform better than boys on verbal tests.In addition to these explanations, the differences between girls and boys in the original Terman-Cesselin and the African Terman-Cesselin can be explained by the fact that the tests selected for administration are essentially verbal tests, and that the adapted test does not seem to contain any bais in the measurement.

In order to extend the scope of the above results, it would be desirable for further studies to be carried out taking into account the 129 tests of the original and adapted Terman-Cesselin in order to be able to make a real distinction between female and male pupils. Subsequent studies should also assess the adaptation process of the Terman-Cesselin Afrique in order to confirm or refute the different intellectual performances produced by the Ivorian populations.

CONCLUSION

The aim of this research was to verify the relevance of adaptations of the Terman Cesselin for male and female primary school pupils in Côte d'Ivoire. The data show positive correlations between the form of the test, gender and intellectual performance in Ivorian primary school pupils. The results also indicate that the intellectual performance of girls on the Adapted Terman Cesselin is higher than that of boys on the Original Terman Cesselin. The results of this work may help predict school failure and draw the attention of researchers and test practitioners to the need to adapt tests in order to get the best out of the individuals tested.

REFERENCES

Angel, R. J. (2013). After Babel: Language and the fundamental challenges of comparative aging research. *Journal of cross-cultural gerontology*, *28*(3), 223-238.

Bureau International Catholique de l'Enfant (B.I.C.E). (1959). Contribution à l'étude de la psychologie de l'enfant africain. In « L'Enfant africain » Conférence de Yaoundé. (1957). (pp. 107-18). Paris, Editions Fleurus

Grégoire, J. (2021). Préface. Dans: Jérôme Rossier éd., *L'évaluation psychologique en contexte multilingue et multiculturel: Questions et enjeux* (pp. 9-10). Wavre: Mardaga

Hambleton, R. K. (2005). Issues, designs, and technical guidelines for adapting tests into multiple languages and cultures. In R. K. Hambleton, P. Merenda, & C. Spielberger (Eds.), *Adapting educational and psychological tests for cross-cultural assessment* (Vol.1, pp. 17-38). Mahwah, NJ: Erlbaum.

Kimura D. (2004). Human sex differences in cognition: fact, not predicament, Sexualities, *Evolution & Gender*, 6, p. 45-53.

Koffi, F. G. (2017). Support de tests et variabilité des performances intellectuelles. *Revue internationale de recherche et d'études pluridisciplinaires*, 6, 92-99.

Koffi, F. G. (2020). Nature du test, moment de la journée et performances intellectuelles chez les élèves de chronotypes différents. *European Journal of Social Sciences Studies*, 5 (3), 38-49.

Kouadio, K. R. (2019). Les tests originaux et adaptés chez les eleves en Côte d'Ivoire: le cas du Terman-Cesselin et du Terman-Cesselin Afrique. Mémoire pour l'obtention du diplôme de Conseiller Psychologue au CIERPA. Abidjan: Université Felix Houphouët Boigny de Cocody.

Lecavalier, L., & Tassé, M. J. (2001). Traduction et adaptation transculturelle du Reiss Screen for Maladaptive Behavior. *Revue francophone de la déficience intellectuelle*, *12*(1), 31-44.

Moreigne, F. et Senecal, J. (1962). Résultats d'un groupe d'enfants africains au Terman-Merrill. *Revue de Psychologie Appliquée*, XII, 1, pp. 15-32.

Ombredane, A. (1969). *L'exploration de la mentalité des Noirs. Le "Congo T.A.T.*". Paris, Presses Universitaires de France, 199 p.

Rene de Cotret, F. (2019). *Processus d'adaptation : Une démarche scientifique pour traduire le test psychométrique*. Mémoire doctorale de l'Université de Laval.

Suwartono, C., Halim, M. S., Hidajat, L. L., Hendriks, M. P. H., & Kessels, R. P. C. (2014). Development and Reliability of the Indonesian Wechsler Adult Intelligence Scale—Fourth Edition (WAIS-IV). *Psychology*, 5, 1611-1619.

Sovet, L., Atitsogbe, K. & Van de Vijver, F. (2021). Chapitre 7. Traduction et adaptation des tests psychologiques. Dans: Jérôme Rossier éd., *L'évaluation psychologique en contexte multilingue et multiculturel: Questions et enjeux* (pp. 135-155). Wavre: Mardaga.

Van de Vijver, F. J. R., & Tanzer, N. K. (2004). Bias and equivalence in cross cultural assessment: An overview. Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology, 54, (p. 119-135). doi: 10.1016/j.erap.2003.12.004.

Wechsler (2014). WPPSI-IV: *Echelle d'Intelligence de Wechsler pour enfants 4ième Edition. Manuel d'interprétation*. Paris: Pearson France –ECPA.

Acknowledgment

The author(s) appreciates all those who participated in the study and helped to facilitate the research process.

Conflict of Interest

The author(s) declared no conflict of interest.

How to cite this article: Koffi, F.G., Tieffi, H.G.R., Gala, T.G. & Kouadio, K.R. (2024). Test Form, Gender and Intellectual Performance in the Original and Adapted Terman-Cesselin Tests for Pupils in Ivory Coast. *International Journal of Indian Psychology*, *12*(2), 013-020. DIP:18.01.002.20241202, DOI:10.25215/1202.002