A Short Form of the Career Interest Test: 21-CIT

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# Abstract

The Career Interest Test (CIT; Athanasou, 2000, 2007) is a widely used 63 item forced-choice instrument that provides the individual with a number of career areas to explore based on their highest ranked, or most preferred, career interests. Administrators of the CIT have requested a shortened form of the test that reduces respondent burden. The aim of this exploratory, secondary data analysis, study is to develop a shortened form of the CIT that shows reliability when compared to the full version of the test. Analyses using a categorical factor model with probit link function for dichotomous variables, equivalent to a 2-parameter IRT model, were undertaken. Items with the highest absolute factor loadings for each career interest comparison were retained in order to create a shortened form of the CIT with 21 questions, and renamed 21-CIT. The large within-subject correlations between career interest scores on the full CIT and the 21-CIT indicate that the shortened form of the CIT does provide a reliable estimate of an individual’s score for each of the career interests. Further study is recommended to investigate the relationship between Athanasou’s seven career interests in relation to the two-dimensional work model (People/Things and Ideas/Data) and to further investigate the psychometric properties of the 21-CIT.

Keywords: Career Interest Test, CIT, short form, 21-CIT, psychometrics

# A Short Form of the Career Interest Test: 21-CIT

The Career Interest Test (CIT; Athanasou, 2000, 2007) is a widely used indicator of an individual’s career interests, expressed as occupations, fields of study, and work-activities. The CIT is integrated into myfuture, Australia’s Career Information & Exploration Service ([www.myfuture.edu.au](http://www.myfuture.edu.au)). A user may create a “career profile” and engage in a range of career exploration activities that are complemented by the CIT. As part of the suite of activities, the CIT a career-interest exploration activity that may be undertaken by an individual, independent of professional guidance, or as a career education or career counselling activity that is prescribed by a professional.

The CIT takes approximately 30 minutes to complete and can be administered in a paper-based or online/electronic form. A review of the CIT (McIlveen, 2012) included recommendations for a shortened form of the CIT that would reduce respondent burden. Further, ESAs review of myfuture arrived at a similar recommendation. A shortened form of the CIT would allow for easier, quicker, and cheaper administration of the instrument, so that it could be administered and discussed in a single career counselling session or within career education classes. Therefore, the aim of the research reported in this paper was to conduct an analysis of archived CIT data, owned by its government administrative body, Education Services Australia (ESA). The primary aim of the research was produce a short-form of the inventory.

## Properties of the CIT

The CIT (Athanasou, 2007) consists of 63 forced-choice items distributed across three subscales, Jobs, Courses, and Activities, with 21 items in each subscale. For example, respondents are asked to choose between *Accountant* or *Journalist* jobs, *Photography* or *Botany* courses, and *Sell Medicines* or *Fly a Plane* activities. It is assumed that an individual’s underlying career preference will inform their choice regarding which statement to endorse at each item. The seven career interests are shown in relation to two work-task dimensions of People versus Things, and Data versus Ideas (Prediger, 1982) According to the relationships on these dimensions, one would expect that an individual with a preference for Outdoor would be more likely to also have a preference for Practical rather than Creative careers.

Each career interest is represented in 18 of the 63 items with 3 items comparing the same two interests, for example, items 1, 22, and 43 represent the career interests of Outdoor and Practical. The choices made at each item contribute to a total score for the seven career interests. The score for each career interest is calculated from the total number of endorsed statements that correspond to that career interest. For example, on item 1 the choices are *Builder* or *Driver*, contributing to the career interests of Practical and Outdoor respectively. If the respondent chooses *Builder* then their total for the Practical career interest will increase by 1, however if they chose *Driver* their total for the Outdoor career interest would increase by 1.

Each individual receives a total score for each of the seven career interests (range 0 - 18) with higher scores indicating a greater preference for the career interest. The career interest scores are used to rank the career interests, with the highest rankings indicating a preference for those career interests. The career interests with the highest rankings provide guidance as to which occupations and careers an individual may prefer and provide a starting point for career and job exploration.

Athanasou (2007) proposed criterion-referenced interpretation for an individual’s score for each career interest. The guidelines were: Very Low, 0–3; Low, 4–7; Medium, 8–11; High, 12–14; Very High, 15 – 18. Scoring and interpretation is ipsative, not normative. Therefore, scores on the CIT are not norm-referenced and are intended for individual reference only. The scores in the very high and very low range are the most indicative of an individual’s preference or dislike for a career interest.

McIlveen (2012) investigated the measurement properties of the CIT (version 4.1) and found that the distributions of scores were near normal distribution of career preference scores, across the three subscales of Jobs, Activities, and Courses. Also, career preference inter-correlations ranged from no meaningful correlation to medium correlations, consistent with the relative position of the career interests on the two work dimensions.

## Career Preferences

Prediger (1982) suggested that two work-tasks dimensions underlie Holland’s RIASEC hexagon: Data/Ideas (working with data versus idea) and Things/People (working with things versus working with people). Prediger et al. (1993) suggests that the two work-task dimensions provide a means of extending Holland’s RIASEC hexagon. The two dimensions have been successfully used to map occupation groups/relationships with Holland’s RIASEC hexagonal model (Prediger, 1996) and with other personality dimensions (Tokar, Vaux, & Swanson, 1995).

Tracey and Rounds (1995) investigated the career preferences of high school and college students to determine if career preferences fit a uniform circular model based on the People/Things and Ideas/Data dimensions. Tracey and Rounds (1995) suggested that the two dimensional People/Things and Ideas/Data model is a good representation of career interests. However, they argued that the career interests themselves are not discrete types and that the overlapping nature of career interests means that any number of career interests could be included in a model. They recommended using between six to eight career preferences in a model to allow suitable discrimination and adequate representation of the career clusters. Tracey and Rounds (1995) suggest that any more than eight career preferences would make the model too cumbersome with relatively small differences between career clusters.

Athanasou (1986) developed A Vocational Interest Survey (AVIS) for the Australian context based on Holland’s RIASEC hexagonal model. AVIS included six career interest areas: Practical, Scientific, and Clerical (equivalent to Holland’s Realistic, Investigative, and Conventional vocational orientations respectively) and Artistic, Social, and Enterprising, (equivalent to Holland’s vocational orientations with the same name). The instrument consists of lists of career related Jobs, Courses, and Activities organised under the banner of the relevant career interest. For each item the respondent chooses whether they Like (= 1) or Dislike (= 0) the career related option. The scores for each career interest were used to rank the career interests in order of preference. The AVIS was developed to assist in career planning by providing reassurance about an individual’s career choice/s, by narrowing the options being considered, or by indicating vocational options for exploration (Athanasou, 1986).

The CIT represents a further development of the AVIS with seven rather than six career interests and a choice of a preferred career statement rather than the Like/Dislike choice. The CIT incorporates the Jobs, Courses, and Activities categories from the AVIS. The clustering of occupations used in the CIT model uses the same principles as Hollands RIASEC hexagonal model and incorporates Prediger’s two work task dimensions. Holland’s vocational orientations model provides the theoretical underpinnings for the seven career interests included in the CIT. The CIT Practical career interest is analogous with Holland’s Realistic vocational orientation, Scientific with Investigative, Creative with Artistic, People Contact with Social, Business with Enterprising, Office with Conventional, and Outdoor with elements of both Realistic and Investigative. Athanasou (2007) incorporated Prediger’s People/Things and Ideas/Data to map the career preferences. The two work dimensions allow the placement of the career interests so that interests with similar skills, abilities, and preferences for People or Things and Ideas or Data will be closer on the dimensions.

# Method

## Participants

ESA supplied a completely anonymous, archival dataset, with a total of *N* = 187,996 cases. Sixty cases had missing values on all items and were removed. All other responses were within the expected range for each variable. The raw data were organised according to age groupings: younger secondary student, *n* = 38, 890 (20.7%); older secondary student, *n* = 112, 711 (60.0%); recent school leaver (last 2 – 3 years), *n* = 5, 664 (3.0%), a further education and training student, *n* = 5, 616 (3.0%); an adult, *n* = 25, 085 (13.3%); and, no category (missing), *n* = 30 (0.0%). It was not possible to determine if a respondent had completed the CIT more than once.

## Procedure

SPSS and MPlus (Muthén & Muthén, 2011) were used for the analyses. A two-tailed *p* test was used due to the exploratory nature of the analyses. The coding method used by the researcher is shown in Appendix B. The probit link with DWLS (WLSMV in MPlus) estimator and theta ($Ф$) parametrization were used to calculate the factor loadings (λ) for each item comparing the same two career interests. Items with the greatest absolute factor loading (|λ|) were retained in the 21-CIT because they showed the best relationship with the underlying latent career preference. All 18 items contributing to the total score for a career interest were used in the calculations to provide the best estimate of individuals underlying career interest preference for the two career interests. Where two items compare the same two career interests the two items are linearly dependent and show local dependence. This dependence is allowed for by freely estimating corresponding residual variances. Sample tetrachoric correlations of the items comparing each pair of career interests were calculated.

The existing archival data were used to calculate new career interest scores for each respondent based on the items retained in the 21-CIT. Pearson correlations were undertaken to investigate the relationship between an individual’s career interest scores for each of the career interests from the CIT and the 21- CIT. These correlation values were used to assess the reliability of the 21-CIT compared to the full CIT.

## Analyses

It is presumed that each person has an underlying latent preference level for each of the seven career interests (Athanasou, 2007). While the CIT career interest scores are determined using the observed categorical measures (chosen or not chosen) it is presumed that the underlying career preference is a continuous variable. This is analogous to an intelligence test where test items may be scored as categorical responses which contribute to a measure of intelligence, which is a continuous trait.

Analyses such as linear confirmatory factor analysis (CFA) with normal theory (NT) estimators require a continuous measure, or an ordered measure with at least five categories, for the observed dependent variables (Bovaird & Koziol, 2013; Finney & DiStefano, 2006; Wirth & Edwards, 2007). A linear, continuous CFA model is misspecified when applied to ordinal variables and is therefore not appropriate when analysing the items on the CIT. The probit link function allows regression modelling when the observed dependent variables are categorical (Bliss, 1935, Sakuma, 1998). The link function transforms the dichotomous value to a continuous value where the probit estimation curve is an s-shaped (sigmoid) cumulative normal distribution that lies between 0 and 1 (Bliss, 1935; Bliss & Stevens, 1937).

A categorical factor model with probit link function for dichotomous variables, which is equivalent to a two-parameter IRT model, would provide factor loadings that account for the dichotomous nature of the data for items contributing to each career interest comparison (Wirth & Edwards, 2007). The Factor loading (λ) indexes the relationship between the item and the underlying trait, with λ2 providing an index of reliability. Items with the greatest absolute factor loading (|λ|) would have the best relationship with the underlying latent preference for each career interest (Muthén, 2002). Items with the stronger relationship between the underlying career preferences would be the most suitable items to retain on a shortened form of the CIT. Equation 1 describes the probit link function.

$P(y\_{ij}=1\left|f\_{i},λ\_{j},τ\_{j}\right)= Ф(-τ\_{j }+ λ\_{j} f\_{i})$ (1)

where *fi* is the individual *i*s factor score, λ is the factor loading for the item (*j*), τ is the threshold for the item (*j*), and $Ф$ is the normal cumulative distribution (Bovaird & Koziol, 2013, p. 499).

The weighted least squares (WLS) estimation method is a robust estimator that is more efficient than ordinary least squares (OLS) estimation, which can be distorted by outliers and heteroscedasticity in the data (Stevens, 2013; Westerlund & Narayan, 2013). Moshagen and Musch (2013) found that the relative bias associated with WLS was always negligible when the sample size was equal to, or greater than, 1000. The WLS method may have less power compared to the OLS method however this can be overcome with a large sample size (Westerlund & Narayan, 2013).

The WLS estimator is used to estimate the unknown regression coefficient in the regression model where the observed dependent variable is categorical (Bliss, 1935; Muthén, 1978, 1984; Wirth & Edwards, 2007). The successive approximations approach the best available estimate and the process stops when the model converges (Bliss & Stevens, 1937; Wirth & Edwards, 2007). The WLS estimator minimises the difference between the observed and estimated population covariance matrices (Tabachnick & Fidell, 2013; Muthén, 1978; Wirth & Edwards, 2007). The diagonal WLS (DWLS) is a more stable estimator, particularly for a small sample size, than the WLS estimator. The DWLS estimator does not require an inversion of the estimated covariance matrix of polychoric correlations and is therefore computationally less complex than WLS estimation (Forero, Maydeu-Olivares, & Gallardo-Pujol 2009; Muthén, 1978, 1984). The DWLS estimator obtains the model parameter by minimising the fitting function, FDWLS, using a diagonal weight matrix as shown in equation 2.

$F\_{DWLS} \left(s- σ\right)^{'W\_{D}^{-1 }}(s-σ)$ (2)

where *s* is the vector of the observed sample covariance matrix, σ is the vector of the observed population covariance matrix, and (WD)j is a diagonal matrix (Yu, 2002, p.23). The test statistic (TWLS) is asymptotically chi-square distributed when the model is correctly specified.

TWLS = (*N* – 1)*F*CAT-WLS($\hat{θ}$) (3)

The CIT design of ranking statements representing different career interests at each item provides a *summative response* scale (Meyers, Gamst, & Guarino, 2006, p.20). While the individual item scores must be considered categorical data and require sample tetrachoric correlations, the total score for each career interest can be considered a summative response, so it is appropriate to treat the scores as interval or ratio measurements and to use statistical analyses such as Pearsons correlation (Meyers et al., 2006, p.23). The Pearson correlation between scores for each Career Interest on the CIT and on the 21-CIT would provide a measure of reliability for the 21-CIT.

# Results

The factor loadings of the items are shown in Table 1. There is insufficient space to provide tabulated summaries of all data analyses; thus the tetrachoric correlation tables are not provided here. Readers may consult the full report (Bartlett, Perera & McIlveen, 2013) for these correlations. The factor loading values provided information as to which items showed the best relationship with the underlying latent career interest preferences. The large same size (N = 187, 966) meant that all factor loadings were likely to be statistically significant. Therefore, there was greater importance in using the absolute factor loadings to ensure that the items with the greatest relationship with the underlying career interests were retained. The absolute factor loading values calculated from the probit link with a DWLS estimator were used to determine 19 of the 21 items retained in the 21-CIT.

The initial factor model analysis of the items contributing to the Creative and Scientific career preferences did not result in an admissible solution. The options for the three items comparing the Creative and Scientific career preferences (Items 3, 24, and 45) were inspected to review how well they represented the career preferences. The option Dentist on item 3 may be an ambiguous discriminator for the Scientific career preference and may be more reflective of the People Contact career preference. . The analyses did not result in an admissible solution in subsequent analyses when item 24 or item 45 were removed from the model. Item 24 (Photography versus Botany) showed a greater relationship with the underlying career preferences and was retained in the 21-CIT. The item 24 option Photography appears to be representative of the Creative career interest, which Athanasou (2007) describes as including creating, composing, and designing. Similarly, the option Botany appears to be representative of the Scientific career interest, which Athanasou describes as including a preference for investigating and discovering ideas. These further analyses supported the decision to drop item 3 from the factor loading analyses, however this has resulted in a reduction in the information included in the analyses. The small sample tetrachoric correlations between items 3, 24, and 45 indicate that the items were not measuring a consistent underlying career preference. Further study could investigate the reliability and validity of item 24.

Items 20 and 62 showed an equally strong relationship with the underlying latent career interest preferences Office and People Contact (|λ| = .637/.626 and .641/.620 respectively). The option representing the People Contact career preference for item 20 (Occupational Therapist) is a specific occupation, however the item 62 option (Help Sick People in Hospital) represents a career activity that may be performed by an occupational therapist as well as other health related and people based occupations. Therefore, item 62 was retained in the 21-item shortened form of the CIT. Other researchers (e.g. Prediger, 1996) also recommend using activities rather than occupation titles where possible, as specific occupations may not be clearly understood by participants. The medium positive sample tetrachoric correlations between items 20 and 62 suggest that the items overlapped in their measurement of the career interests.

# Discussion

The CIT is a publicly available and widely used instrument designed to provide an indicator of an individual’s career interests conceptualized in terms of Prediger’s (1982) People/Things and Ideas/Data framework. The aim of this study was to create a shortened form of the CIT that shows reliability when compared to the full version of the test. The large effect sizes shown in the correlations between career interest scores on the full CIT and the 21-CIT indicate that the shortened form of the CIT provides a reliable estimate of an individual’s score for each of the career interests.

More than a decade since the Organisation for Economic Cooperation and Development (OECD, 2002) reviewed Australia’s career guidance policies, the difference between Australia’s career information system then and now is quite remarkable. Australia’s Career Information and Exploration Service, and its main portal site, myfuture, provides access, free-of-charge, to high-quality career development resources. The CIT has played an important role in the evolution and delivery of those resources, evident in the fact of more than 180 000 online administrations in the period of time encompassing the current archived dataset. Doubtless, the OECD would find evidence of a world-class national career information system that is widely accessible. Given consumers’ demand for ease of access and usability, the 21-CIT will allow for even easier, quicker, and cheaper administration of a career interest tool, and concomitantly enhance usability and accessibility of myfuture as a package.

With respect the limitations of the current research, the large population of the dataset provides grounds for confidence that the data are relatively representative of the broader Australian population. Unfortunately, the dataset did not include actual age in years; instead, membership of an age category was available as the nearest indicator. Furthermore, while the factor structure is consistent with expectations and theory, there is no way to determine criterion validity with the current dataset. Therefore, we recommend that the psychometric properties of the 21-CIT be investigated, including comparing results of the 21-CIT with other career interest tests. Also, we recommend that there be investigations into the relationship between Athanasou’s seven career interests in relation to the two-dimensional People/Things and Ideas/Data model.

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Table 1

*Factor Loadings for CIT Items*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Item | Item Options | λ | SEa | 95% CIa | λcs | 95% CIb |
|  |  |  |  | LL UL |  | LL UL |
| Outdoor |
|  Item 1 | Driver vs Builder | 1.000c |  - | - | .449 | .444, .455 |
|  **Item 22**y | **Agriculture vs Engineering** | **1.161** | **0.012** | **1.139, 1.184** | **.504** | **.499, .509** |
|  Item 43 | Grow Crops vs Build a House | 0.540 | 0.008 | 0.525, 0.554 | .262 | .256, .268 |
| Practical |
|  Item 1 | Builder vs Driver | 1.000c |  - | - | .446 | .440, .451 |
|  **Item 22**y | **Engineering vs Agriculture** | **1.166** | **0.012** | **1.143, 1.188** | **.502** | **.497, .507** |
|  Item 43 | Build a House vs Grow Crops | 0.544 | 0.008 | 0.529, 0.559 | .261 | .255, .267 |
| Scientific |
|  Item 2 | Scientist vs Engineer | 1.000c |  - |  - | .714 | .710, .719 |
|  **Item 23y** | **Chemistry vs Electronics** | **1.014** | **0.008** | **0.998, 1.030** | **.719** | **.714, .724** |
|  Item 44 | Sell Medicines vs Fly a Plane | 0.599 | 0.006 | 0.588, 0.610 | .522 | .516, .527 |
| Practical |
|  Item 2 | Engineer vs Scientist | 1.994 | 0.020 | 1.955, 2.033 | .668 | .664, .672 |
|  **Item 23y** | **Electronics vs Chemistry** | **2.016** | **0.021** | **1.976, 2.056** | **.672** | **.668, .676** |
|  Item 44 | Fly a Plane vs Sell Medicines | 1.245 | 0.014 | 1.218, 1.272 | .489 | .483, .494 |
| Creative |
|  Item 3 | Musician vs Dentist |  -  |  - |  - |  - |  - |
|  **Item 24y** | **Photography vs Botany** | **0.735** | **0.014** | **0.709, 0.762** | **.263** | **.256, .271** |
|  Item 45 | Make Diamond Rings vs Massage Sore Muscles | 0.083 | 0.009 | 0.066, 0.101 | .031 | .024, .038 |
| Scientific |
|  Item 3 | Dentist vs Musician |  - |  - |  - |  - |  - |
|  **Item 24y** | **Botany vs Photography** | **0.290** | **0.006** | **0.277, 0.302** | **.226** | **.217, .234** |
|  Item 45 | Massage Sore Muscles vs Make Diamond Rings | 0.130 | 0.005 | 0.121, 0.139 | .103 | .096, .110 |
| People Contact |
|  Item 4 | Teacher vs Actor/Actress | 1.000c  |  - |  - | .406 | .400, .412 |
|  Item 25 | Education/Teaching vs Art | 1.424 | 0.013 | 1.398, 1.449 | .534 | .529, .540 |
|  **Item 46y** | **Give Advice about Jobs vs Act in a Play** | **1.726** | **0.015** | **1.696, 1.756** | **.608** | **.603, .613** |
| Creative |
|  Item 4 | Actor/Actress vs Teacher | 0.677 | 0.007 | 0.644, 0.691 | .406 | .400, .411 |
|  Item 25 | Art vs Education/Teaching | 0.964 | 0.009 | 0.947, 0.982 | .534 | .529, .539 |
|  **Item 46y** | **Act in a Play vs Give Advice about Jobs** | **1.169** | **0.011** | **1.148, 1.189** | **.608** | **.603, .613** |
| Office |
|  Item 5 | Librarian vs Shopkeeper | 1.000c |  - |  - | .252 | .246, .259 |
|  Item 26 | Administration vs Retailing | 0.931 | 0.016 | 0.900, 0.962 | .236 | .230, .242 |
|  **Item 47y** | **Prepare Tax Retuns vs Own a Shop** | **1.411** | **0.024** | **1.363, 1.459** | **.345** | **.338, .353** |
| Business |
|  Item 5 | Shopkeeper vs Librarian | 1.000c |  - |  - | .261 | .255, .268 |
|  Item 26 | Retailing vs Administration | 0.926 | 0.015 | 0.896, 0.956 | .243 | .237, .249 |
|  **Item 47y** | **Own a Shop vs Prepare Tax Returns** | **1.422** | **0.024** | **1.376, 1.469** | **.360** | **.352, .367** |
| Business |
|  Item 6 | Sales Representative vs Careers Adviser | 0.933 | 0.017 | 0.901, 0.966 | .243 | .237, .249 |
|  Item 27 | Business vs History | 0.673 | 0.014 | 0.645, 0.701 | .178 | .171, .184 |
|  **Item 48** | **Supervise Others vs Help Families with Problems** | **2.349** | **0.036** | **2.278, 2.420** | **.533** | **.528, .539** |
| People Contact |
|  Item 6 | Careers Adviser vs Sales Representative | 1.651 | 0.042 | 1.569, 1.733 | .238 | .231, .244 |
|  Item 27 | History vs Business | 1.183 | 0.035 | 1.114, 1.252 | .173 | .166, .179 |
|  **Item 48** | **Help Families with Problems vs Supervise Others** | **4.151** | **0.099** | **3.957, 4.346** | **.524** | **.519, .529** |
| Outdoor |
|  Item 7 | Surveyor vs Vet | 1.534 | 0.025 | 1.485, 1.582 | .411 | .405, .418 |
|  **Item 28y** | **Physical Education vs Medicine** | **3.991** | **0.060** | **3.874, 4.108** | **.761** | **.757, .766** |
|  Item 49 | Train for Sport vs Treat Sick Animals | 2.820 | 0.041 | 2.740, 2.899 | .639 | .633, .644 |
| Scientific |
|  Item 7 | Vet vs Surveyor | 0.562 | 0.007 | 0.549, 0.575 | .415 | .409, .421 |
|  **Item 28y** | **Medicine vs Physical Education** | **1.431** | **0.014** | **1.403, 1.459** | **.758** | **.754, .763** |
|  Item 49 | Treat Sick Animals vs Train for Sport | 1.005 | 0.010 | 0.986, 1.025 | .633 | .627, .638 |
| Creative |
|  Item 8 | Architect vs Pilot | 0.431 | 0.008 | 0.416, 0.446 | .248 | .241, .256 |
|  **Item 29y** | **Music vs Woodwork** | **2.438** | **0.028** | **2.383, 2.492** | **.824** | **.819, .828** |
|  Item 50 | Design Buildings vs Fix Machines | 1.208 | 0.015 | 1.180, 1.237 | .584 | .578, .590 |
| Practical |
|  Item 8 | Pilot vs Architect | 0.568 | 0.009 | 0.550, 0.586 | .265 | .259, .271 |
|  **Item 29y** | **Woodwork vs Music** | **1.966** | **0.019** | **1.929, 2.003** | **.689** | **.685, .693** |
|  Item 50 | Fix Machines vs Design Buildings | 1.398 | 0.016 | 1.368, 1.429 | .560 | .555, .565 |
| People Contact |
|  Item 9 | Social Worker vs Doctor | 0.568 | 0.021 | 0.527, 0.608 | .103 | .096, .109 |
|  **Item 30** | **Home Science vs Physics** | **1.490** | **0.034** | **1.424, 1.557** | **.262** | **.255, .268** |
|  Item 51 | Help People with Injuries vs Diagnose an Illness | 0.322 | 0.020 | 0.284, 0.361 | .058 | .052, .065 |
| Scientific |
|  Item 9 | Doctor vs Social Worker | 0.122 | 0.005 | 0.132, 0.113 | .087 | .080, .093 |
|  **Item 30** | **Physics vs Home Science** | **0.378** | **0.006** | **0.389, 0.366** | **.261** | **.254, .267** |
|  Item 51 | Diagnose an Illness vs Help People with Injuries | 0.111 | 0.005 | 0.101, 0.120 | .079 | .072, .086 |
| Outdoor |
|  Item 12 | Greenkeeper vs Jeweller | 0.867 | 0.025 | 0.818, 0.916 | .163 | .155, .170 |
|  Item 33 | Geography vs Textiles | 2.127 | 0.047 | 2.034, 2.220 | .375 | .368, .381 |
|  **Item 54y** | **Measure Blocks of Land vs Play in a Band** | **6.733** | **0.146** | **6.446, 7.019** | **.788** | **.782, .794** |
| Creative |
|  Item 12 | Jeweller vs Greenkeeper | 0.197 | 0.005 | 0.188, 0.206 | .152 | .145, .158 |
|  Item 33 | Textiles vs Geography | 0.458 | 0.006 | 0.447, 0.469 | .336 | .330, .342 |
|  **Item 54y** | **Play in a Band vs Measure Blocks of Land** | **1.289** | **0.011** | **1.267, 1.311** | **.709** | **.705, .713** |
| Business |
|  **Item 14** | **Manager vs Pharmacist/Chemist** | **1.220**  | **0.014** | **1.192, 1.247** | **.495** | **.489, .500** |
|  Item 35 | Commerce vs Biology | 0.890 | 0.011 | 0.868, 0.912 | .383 | .377, .389 |
|  Item 56 | Organise Travel Plans vs Fix Teeth | 0.158 | 0.008 | 0.142, 0.174 | .073 | .066, .081 |
| Scientific |
|  **Item 14** | **Pharmacist/Chemist vs Manager** | **0.455** | **0.005** | **0.445, 0.465** | **.493** | **.488, .499** |
|  Item 35 | Biology vs Commerce | 0.333 | 0.004 | 0.325, 0.341 | .384 | .378, .389 |
|  Item 56 | Fix Teeth vs Organise Travel Plans | 0.061 | 0.003 | 0.055, 0.067 | .076 | .069, .083 |
| Business |
|  **Item 13y** | **Travel Agent vs Mechanic** | **4.862**  | **0.015** | **4.738, 4.987** | **.799** | **.796, .803** |
|  Item 34 | Advertising vs Metalwork | 4.706 | 0.061 | 4.586, 4.827 | .790 | .786, .793 |
|  Item 55 | Visit Customers vs Fix Lights | 3.791 | 0.050 | 3.693, 3.889 | .720 | .715, .724 |
| Practical |
|  **Item 13y** | **Mechanic vs Travel Agent** | **3.040** | **0.030** | **2.981, 3.100** | **.828** | **.824, .831** |
|  Item 34 | Metalwork vs Advertising | 2.925 | 0.029 | 2.869, 2.982 | .817 | .814, .821 |
|  Item 55 | Fix Lights vs Visit Customers | 2.301 | 0.023 | 2.257, 2.345 | .745 | .741, .749 |
| Office |
|  Item 15 | Accountant vs Journalist |  9.089 | 0.290 |  8.521, 9.657 | 0.736 | .731, .741 |
|  Item 36 | Computing vs Poetry |  7.336 | 0.233 |  6.897, 7.793 | 0.659 | .654, .665 |
|  **Item 57y** | **Work in an Office vs Paint Portraits** | **12.555** | **0.409** | **13.357, 11.753** | **0.832** | **. 828, .837** |
| Creative |
|  Item 15 | Journalist vs Accountant |  1.278 | 0.012 |  1.255, 1.301 | 0.652 | .648, .657 |
|  Item 36 | Poetry vs Computing |  1.087 | 0.011 |  1.067, 1.108 | 0.591 | .586, .596 |
|  **Item 57y** | **Paint Portraits vs Work in an Office** |  **1.707** | **0.016** |  **1.676, 1.738** | **0.754** | **.751, .758** |
| Outdoor |
|  **Item 16y** | **Forester vs Nurse** | **2.920** | **0.036** | **2.850, 2.990** | **.738** | **.733, .742** |
|  Item 37 | Environment vs Health Care | 1.718 | 0.021 | 1.676, 1.760 | .541 | .536, .547 |
|  Item 58 | Look After Forests vs Look After Children | 2.249 | 0.027 | 2.195, 2.302 | .644 | .639, .649 |
| People Contact |
|  **Item 16y** | **Nurse vs Forester** | **8.612** | **0.245** | **8.133, 9.092** | **.726** | **.722, .730** |
|  Item 37 | Health Care vs Environment | 5.151 | 0.146 | 4.864, 5.438 | .534 | .528, .539 |
|  Item 58 | Look After Children vs Look After Forests | 6.727 | 0.191 | 6.353, 7.101 | .636 | .631, .641 |
| Office |
|  **Item 17y** | **Economist vs Electrician** | **3.021**  | **0.034** | **2.953, 3.088** | **.705** | **.701, .710** |
|  Item 38 | Mathematics vs Plumbing | 1.244 | 0.016 | 1.213, 1.276 | .379 | .373, .385 |
|  Item 59 | Develop Computer Software vs Fix Computers | 0.759 | 0.012 | 0.735, 0.783 | .243 | .237, .248 |
| Practical |
|  **Item 17y** | **Electrician vs Economist** | **2.329** | **0.023** | **2.284, 2.373** | **.718** | **.715, .722** |
|  Item 38 | Plumbing vs Mathematics | 0.941 | 0.011 | 0.919, 0.962 | .385 | .379, .391 |
|  Item 59 | Fix Computers vs Develop Computer Software | 0.573 | 0.009 | 0.555, 0.590 | .246 | .240, .252 |
| Office |
|  Item 18 | Computer Programmer vs Physiotherapist | 1.782 | 0.026 | 1.732, 1.833 | .529 |  .523, .535 |
|  **Item 39y** | **Accountancy vs Geology** | **1.851** | **0.025** | **1.802, 1.901** | **.543** | **.538, .549** |
|  Item 60 | Manage a Library vs Work in a Science Lab | 0.169 | 0.010 | 0.148, 0.189 | .059 | .052, .066 |
| Scientific |
|  Item 18 | Physiotherapist vs Computer Programmer | 0.805 | 0.009 | 0.787, 0.822 | .516 | .510, .522 |
|  **Item 39y** | **Geology vs Accountancy** | **0.813** | **0.009** | **0.796, 0.830** | **.520** | **.514, .525** |
|  Item 60 | Work in a Science Lab vs Manage a Library | 0.140 | 0.005 | 0.131, 0.149 | .104 | .097, .111 |
| Outdoor |
|  Item 19 | Farmer vs Business Owner | 1.094 | 0.013 | 1.068, 1.121 | .449 | .443, .455 |
|  **Item 40y** | **Building vs Economics** | **2.120** | **0.022** | **2.076, 2.163** | **.697** | **.693, .702** |
|  Item 61 | Drive a Truck vs Be in Charge of Workers | 1.245 | 0.016 | 1.215, 1.276 | .496 | .490, .502 |
| Business |
|  Item 19 | Business Owner vs Farmer | 2.574 | 0.052 | 2.471, 2.667 | .449 | .442, .455 |
|  **Item 40y** | **Economics vs Building** | **4.981** | **0.094** | **4.798, 5.165** | **.697** | **.692, .701** |
|  Item 61 | Be in Charge of Workers vs Drive a Truck | 2.926 | 0.058 | 2.813, 3.040 | .495 | .489, .502 |

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| Office |
|  Item 20 | Banker vs Occupational Therapist | 2.789 | 0.040 | 2.710, 2.868 | 0.641 | .636, .645 |
|  Item 41 | Secretarial Studies vs Religious Studies | 0.946 | 0.017 | 0.913, 0.979 | 0.272 | .266, .279 |
|  **Item 62y** | **Approve a Home Loan vs Help Sick People in Hospital** | **2.766** | **0.040** | **2.687, 2.845** | **0.637** | **.632, .643** |
| People Contact |
|  Item 20 | Occupational Therapist vs Banker | 8.071 | 0.283 | 7.516, 8.627 | 0.620 | .615, .625 |
|  Item 41 | Religious Studies vs Secretarial Studies | 2.752 | 0.102 | 2.552, 2.952 | 0.260 | .253, .267 |
|  **Item 62y** | **Help Sick People in Hospital vs Approve a Home Loan** | **8.194** | **0.289** | **7.628, 8.760** | **0.626** | **.621, .631** |

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| Outdoor |
|  Item 21 | Sportsman/woman vs Financial Planner | 2.951 | 0.039 | 2.874, 3.029 | .681 | .676, .686 |
|  Item 42 | Zoology vs Librarianship | 1.341 | 0.020 | 1.302, 1.380 | .389 | .383, .395 |
|  **Item 63y** | **Prepare a Lawn vs Analyse Finances** | **3.513** | **0.047** | **3.421, 3.606** | **.742** | **.738, .746** |
| Office |
|  Item 21 | Financial Planner vs Sportsman/woman | 4.058 | 0.070 | 3.922, 4.195 | .688 | .683, .693 |
|  Item 42 | Librarianship vs Zoology | 1.845 | 0.031 | 1.783, 1.906  | .396 | .390, .402 |
|  **Item 63y** | **Analyse Finances vs Prepare a Lawn** | **4.879** | **0.085** | **4.713, 5.046** | **.752** | **.747, .756** |

*Note.* *N* = 187,966. CI = confidence interval; LL = lower limit; UL = upper limit; λ = unstandardised factor loading; λcs = completely standardized factor loading. y This item was retained on the 21 item shortened form of the CIT. a These values are based on unstandardised estimates. b These values are based on standardized estimates.  c These loadings were fixed to 1.00 to establish the metric of the latent career preference. All factor loadings are significant at *p* < .001.

## Table 2

## *Correlation between Career Interest Scores on the Full CIT and the Shortened 21-CIT*

|  |  |  |
| --- | --- | --- |
| Career Interest |  *r* | *r*2 |
| Outdoor CIT and 21-CIT | .788 | .621 |
| Scientific CIT and 21-CIT | .792 | .627 |
| Business CIT and 21-CIT | .718 | .516 |
| People Contact CIT and 21-CIT | .822 | .676 |
| Practical CIT and 21-CIT  | .898 | .806 |
| Office CIT and 21-CIT | .797 | .635 |
| Creative CIT and 21-CIT | .855 | .731 |

*Note.* *N* = 187,966. *p* < .001