Quantitative Assessment of Handedness and Cerebral Lateralization

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Abstract

Handedness, defined as a preference for one hand over the other, is the most studied human asymmetry due to its connection to various lateralized behaviours, and hence many studies have focused on developing a valid assessment. A prominent questionnaire is the Edinburgh Handedness Inventory (EHI); however, its psychometric properties have been questioned, and due to its complex response format, various modified versions of EHI are in use. One of them is a 7-item questionnaire produced by Dragovic and Milenkovic (2013) that seeks to reduce a potentially continuous variable to a categorical one by clearly classifying people as right- or left-handed. The purpose of this study was to develop a questionnaire to more accurately quantify mixed-handedness as a continuous variable and to investigate the correlation between Dragovic's modified 7-item EHI, new items created for this study, and three performance measures (grooved pegboard, finger tapping, and grip strength/dynamometer). A total of 113 self-reported right-, left- and mixed-handed participants were randomly recruited to complete the questionnaire and behavioural measures. The questionnaire data was submitted to exploratory factor analysis and resulting factor scores were examined for correlations with behavioural tests. Compared to the modified EHI, the questionnaire showed further continuous grading of handedness. Moreover, the degree of handedness on the questionnaire showed a stronger correlation with all the performance measures than the performance measures had amongst themselves. These findings show that the novel questionnaire with modern-day items can provide an accurate estimate of the degree of mixed-handedness in both right- and left-handed individuals. Future studies should examine these measures on a larger sample of left-handed and ambidextrous people, who tend to be more variable than right-handers in their usage. The questionnaire can also be suitable for studying the relationship between variable handedness and other aspects of brain lateralization.

Keywords: handedness, preference/performance measures, factor analysis

Introduction

Handedness is the most pronounced lateralized behaviour observed in humans. It is described as a preference for one hand over the other when performing unimanual tasks (Cavill & Bryden, 2003). Handedness can be further divided into two components: direction and degree. Direction defines whether the person is right- or left-handed, whereas degree defines the strength of that direction, that is, how strongly they prefer that hand (Steenhuis & Bryden, 1989). Several studies have shown that about 90% of the population prefers the right hand (Annett, 1985), with only 10% showing left-hand preference. In order to eliminate potential confounding effects, hand preference is often measured to subtype individuals into groups when studying other lateralized behaviours due to its relatedness to various asymmetric cerebral functions (Corballis, 2003). For example, 90% of right-handers were found to be left-cerebrally dominant for language, whereas this is the case for only 70% of left-handers (Corballis, 2003). A study by Knecht et al. (2000) also found left-cerebral activation during word generation to be linearly related to the degree of right-handedness. Other than language, researchers discovered handedness to be associated with other functional differences, including intelligence (Johnston et al., 2009; Nicholls et al., 2010, 2012) and schizotypy (a continuum of personality characteristics and experiences, ranging from normal to psychosis) (Bryson et al., 2009; Chapman et al., 2011; Nicholls et al., 2005). This unique association between various lateralized cerebral functionalities and handedness makes handedness a crucial entity to measure accurately.

Scientists have developed several instruments to measure handedness. Because handedness is determined based on personal preference, self-report questionnaires with certain unimanual tasks are commonly used to measure both direction and degree (Cavill & Bryden, 2003). Although hand preference measures are convenient, the subjectivity of tasks and the inability to administer them to people of all ages and demographics (e.g., children and older adults) limit their usefulness (Bryden et al., 1996, 2000a, 2000b) and cause some researchers to lean towards hand performance measures (an indirect method). Hand performance measures use physical measurements of manual activities to objectively quantify skill differences between the hands (Ocklenburg & Güntürkün, 2018).

The most widely used hand preference measure to date is the Edinburgh Handedness Inventory (EHI) (Edlin et al., 2015), a questionnaire reflecting 10 unimanual tasks with adjacent right and left choice columns, where participants report their performance with a + for moderate and ++ for strong preference (Oldfield, 1971). Despite its widespread use, a few studies have questioned its psychometric properties and suggested a simplified form of EHI as a better assessment of primary handedness factor (Bryden 1977; Dragovic, 2004; Veale, 2014). Although it was explicitly stated that the accuracy of the questionnaire depends on following the exact format when administered (Oldfield, 1971), the complicated response format makes it unfeasible for many potential participants (Mcmeekan & Lishman, 1975; Fazio et al., 2012). As a result, various researchers tend to use diverse modified forms of the EHI in terms of items, response format, and criteria used to distinguish left- and right-handers (Edlin et al., 2015). A modified version of the EHI produced by Dragovic and Milenkovic (2013) has achieved fairly widespread use, with 35 CrossRef citations noted as of July 22, 2020, on the Taylor and Francis Online website; however, it focuses more on direction rather than the degree of handedness, as it is specifically optimized to classify participants unambiguously as right- or left-handed, whereas many people could otherwise be considered to exhibit mixed-handedness. Moreover, most of the available questionnaires contain items that are outdated due to technological changes; for example, nowadays people use a vacuum cleaner more than a broom and also use devices such as phones and computers extensively, compared to the prevailing conditions in 1971 when the EHI was originally published.

The present work aimed to address the issues outlined above. Namely, it intended to develop a questionnaire by adding new items to the modified EHI of Dragovic and Milenkovic (2013) to quantify both degree and direction of handedness, aiming at a fine-grained estimate of mixed handedness. The study also sought to characterize the correlations between said questionnaire, the modified EHI, and three different commonly used performance measures, in order to identify the suitability of the new items compared to the extensively studied EHI items for quantifying handedness, to reduce reliance on subjectively measured hand preference questionnaires alone, and to benefit from the increased reliability and validity available from combining preference and performance measures (Corey et al., 2001; Brown et al., 2006). A questionnaire was developed using the seven items from Dragovic and Milenkovic (2013) (will be referred to as Dragovic's items/7items) along with 25 additional items (will be referred to as new items) that we selected from other questionnaires (Cohen, 2008; Strien, 2002) or created ourselves. Three performance measures were also collected in a randomized order, namely the Grooved Pegboard Test (GPT), the Finger Tapping (FT) test, and the Grip Strength test (using Dynamometer). The three performance tests are widely used to measure manual asymmetries due to their ability to assess distinct aspects of hand performance, including visuomotor control, motor speed, and raw strength, respectively. Following data collection, exploratory factor analysis and comparisons of correlations were performed on the Laterality Quotient (LQ) obtained from the preference and performance measures. LQ is an operation prevalent in handedness literature that is used to establish the degree and direction of handedness, typically using the formula (R - L/R + L) x 100, where a score of +100 represents strong right-handedness and -100 represents strong left-handedness. Successful completion of this study would provide the scientific community with an updated questionnaire that potentially taps into the cerebral asymmetries underlying lateralized motor function and categorizes the degree of individual lateralization more sensitively than the traditional dichotomy of right- and left-handedness groups.

Methods

Participants

This study involved 113 participants, the majority of whom were students in Introductory Psychology courses at the University of Toronto Scarborough, who signed up through SONA, the research recruitment software of the Department of Psychology, and obtained a course credit for participation. Of the 113 participants, 98 self-reported as right-handed (65F, 33M, mean age 19.2, SD 3.22), 12 as left-handed (9F, 3M, mean age 19.2, SD 3.26), and 3 as ambidextrous (3F, mean age 20.8, SD 5.16). Written informed consent and background information were obtained from all participants before starting the experiment. This project was approved by Delegated Ethics Review Committees (DERCs) at the University of Toronto Scarborough.

Apparatus and Procedure

All participants were required to complete the questionnaire along with the three performance tasks (grooved pegboard test, finger tapping test, and grip strength test). The order in which the questionnaire and the performance tests were administered was randomized.

Handedness Questionnaire. The questionnaire consists of 32 items: 7 items from Milenkovic and Dragovic (2013) and 25 new items obtained from other research questionnaires or created based on everyday situations (Appendix A). The Dragovic items were added as a comparison due to the immense evidence of their ability to capture handedness. The participants were asked to report their hand preference for each item on a five-point Likert scale, options being “always left,” “usually left,” “no preference,” “usually right,” and “always right.” Each response was scored from 1 to 5, respectively. Three different laterality quotients (LQ) were calculated: the first from Dragovic’s seven items, the second from the 25 new items, and the third from the combination of both (32 items). The LQs calculated using:

(R-performance — L-performance) / (R-performance + L-performance) x 100 ranged from -100, indicating strong left-hand preference, to 100, indicating strong right-hand preference.

Grooved Pegboard (GP). The grooved pegboard contains 25 grooved-peg holes arranged in a 5 x 5 array on a 10 cm x 10 cm metal plate (Lafayette Instrument Company). The standard instructions on the Lafayette Instrument Model 32025 GP User's Manual (Lafayette Instrument, 2014) were followed when administering the task. The pegboard was placed mid-line with the subjects, and they were asked to start with their dominant hand. For the right hand, pegs are to be inserted sequentially from left to right for each row and in the opposite direction for the left hand. Participants were also instructed to pick up only one peg at a time, not to pick up a peg if dropped (but rather pick a new peg from the well containing them) and to be as fast as they could. The timing began when the participant picked up the first peg and ended when they inserted the last peg. Each hand was tested once, and the total time (in seconds) taken to insert all the pegs was recorded for each hand.

Finger Tapping (FT). The Finger Tapping task was programmed in Psychopy (Standalone v3.2.4) (Pierce et al., 2019), and the responses were collected using a four-key button box (202mm x 137mm x 35mm LWH; The Black Box Toolkit). The task consists of three trials per hand, with each trial containing 15 s of tapping followed by 6 s of break. The participants were asked to use their index finger to tap, and, before each trial, they were notified of the hand to be used, followed by a countdown. The order of the trials was randomized. At the end of the task, the total number of taps for each trial was recorded and averaged for each hand.

Grip Strength (GS). GS was measured using a Jamar Plus Digital Hand Dynamometer. The built-in "standard test left and right hand" feature on the dynamometer was used, with the number of trials set to 3. The participants were asked to hold the dynamometer while sitting with a straight arm and provide maximum GS efforts. The trials were performed in an alternating manner. At the end of all six tests, performance average and standard deviation were recorded for each hand. The units of measurement were kilograms.

Data Coding

Performance on the questionnaire, GPT, FT, and Dynamometer were expressed as a laterality quotient (LQ) using the formula:

$$(\text{R-performance} - \text{L-performance}) / (\text{R-performance} + \text{L-performance}) \times 100$$

(Milenkovic & Dragovic, 2013; Davidson & Tremblay, 2013). For all measures except GPT, a positive LQ obtained using this formula indicates right-hand superiority, whereas negative LQ indicates left-hand superiority. For consistency, GPT LQs resulting from the equation above were multiplied by -1, so that all positive LQs mean right-hand superiority. All data were then subjected to factor analysis and correlation matrix using RStudio software.

Data Clean-Up

From a total of 113 participants that were randomly recruited (98 self-reported right- and 12 self-reported left-handed, 3 ambidextrous), some failed to complete the FT task successfully as the data suggested that they were not pressing the button as fast as they actually could. Therefore, five participants were excluded altogether (all right-handed), and for an additional 10 participants, the first trial (out of three trials) was eliminated due to higher tapping rates on the second and third trials, which means that the first trial didn't represent their optimal performance. Altogether, FT data from a total of 108 participants was used in the analysis; the rest remained unchanged (i.e. 113).

Statistical Analysis

All graphs and statistical analyses were produced using RStudio (v 1.2.5033).

Results

New Items Showed Better Effectiveness at Categorizing Mixed-handed People

The Laterality Quotient (LQ) was established using the formula: (R-performance – L-performance) / (R-performance + L-performance) x 100 (average was used in case of multiple trials; Dragovic & Milenkovic, 2013; Davidson & Tremblay, 2013). Positive LQs were considered as right-hand dominance and negative LQs as left-hand dominance. LQs obtained from Dragovic's 7-items were found to be heavily bimodal, showing extreme right or left values (as intended), whereas LQs obtained from the new items showed more variability (Figure 1). From Figure 1A, it is also visible that although the 7-item questionnaire categorized right-handed individuals more consistently mixed-handed people also got categorized into strongly right- or left-handed groups. Conversely, the new items categorized mixed-handed people as less strongly right-handed (Figure 1B). Together, the questionnaire seemed to categorize all three groups quite precisely (Figure 1C). LQs obtained from the Dynamometer appeared to be more strongly left-skewed compared to those of the GPT and FT, with Dynamometer and FT categorizing mixed-handed people as more left-handed (Figure 2). Figure 2 also shows that data from right-handed individuals were slightly more accurately depicted by FT compared to GPT and the Dynamometer test, with the majority of LQs being above 0. However, data from left-handed individuals were more spread out in GPT compared to the other two and were more accurately depicted by Dynamometer.

Factor Analysis Produced a Two-factor Solution

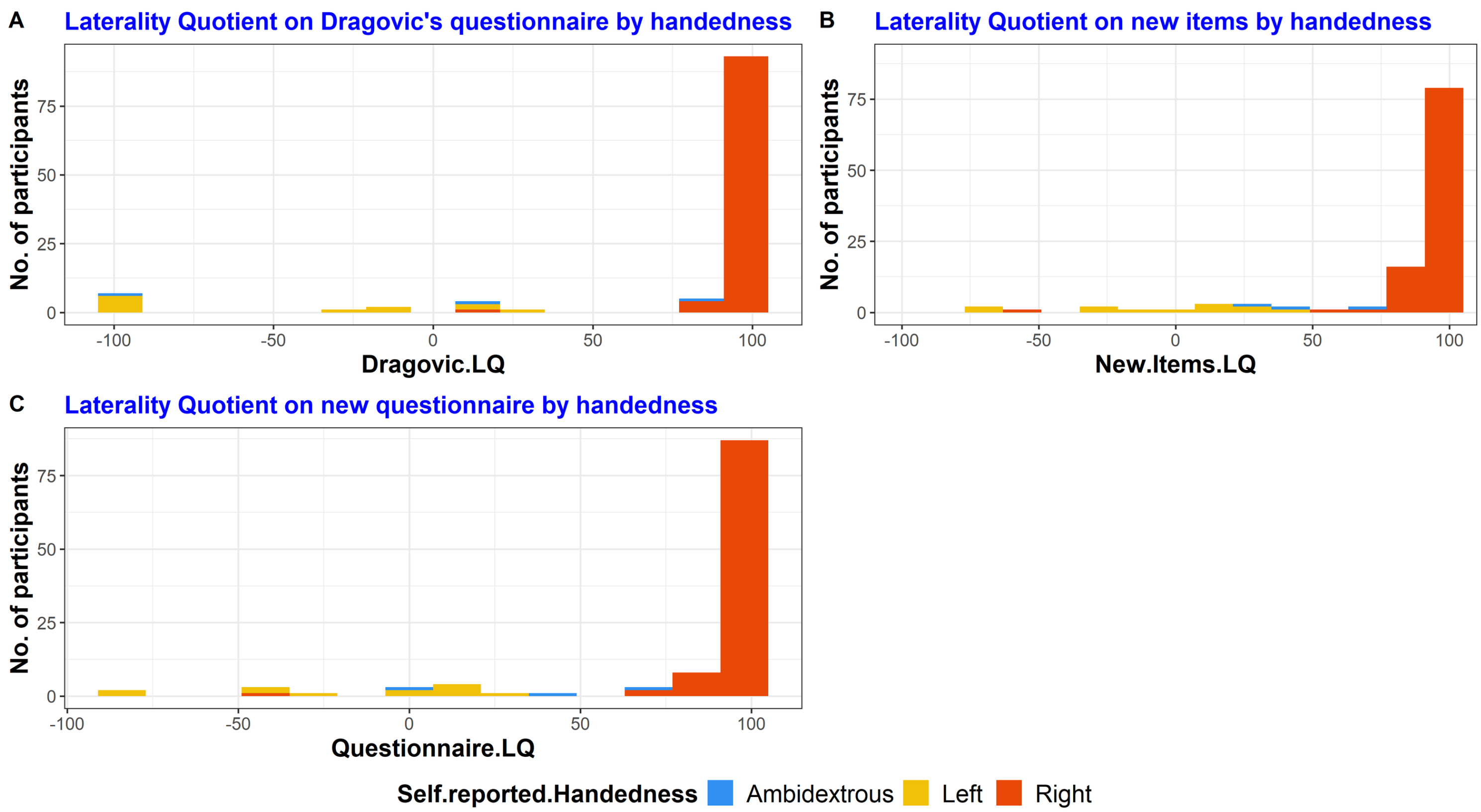

Figure 1. Laterality Quotient (LQ) obtained from Dragovic's 7-item questionnaire. **(A)** Additional new items. **(B)** All items combined. **(C)** Based on participant's self-reported handedness (*n* = 113: 98 right, 12 left, and 3 ambidextrous).

Responses on the questionnaire (32 items) were subjected to parallel analysis and exploratory factor analysis using the R package psych. A parallel analysis was performed on the questionnaire (32 items) to determine the number of factors present, involving a comparison of eigenvalues between the data and randomized data with the same structure (Horn, 1965). This procedure suggested the presence of two distinct factors, as there were two points above the dashed line depicting an eigenvalue of 1 (Kaiser criterion; Figure 3A), and the software reported a 2-factor solution as most likely. A two-factor solution was then produced using exploratory factor analysis (EFA) with the rotation "varimax" and factor extraction method "minimum residual" (Williams et al., 2012), with factor 1 explaining 48% and factor 2 explaining 5% of the total variance. Pearson's correlation reported the correlation between the two factors to be 0.11 (Figure 3B). The analysis showed that the 7-item questionnaire loaded heavily onto factor 1 (heavy criteria: a difference >.1 between the loadings), with items 3 and 4 loading only onto factor 1 (in blue) using a cut-off value of 0.30 (Table 1). Most of the new items loaded more or less onto both factors, with 7 of them (items 10, 13, 16, 18, 23, 26, 30) loading heavily onto factor 1 (in yellow) and 6 of them (items 8, 12,

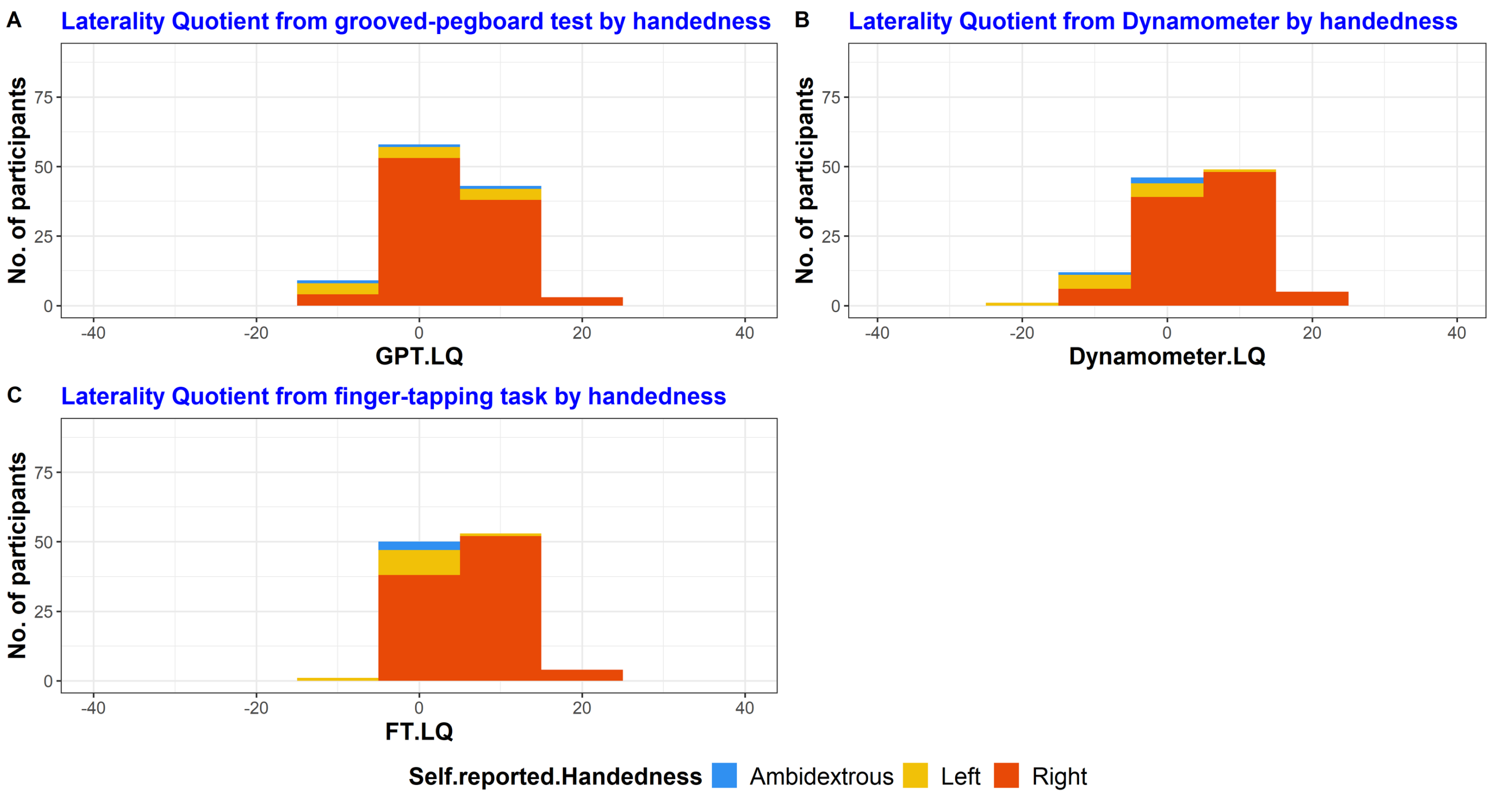

Figure 2. The Laterality Quotient (LQ) obtained from Grooved Pegboard test (GPT). **(A)** Dynamometer. **(B)** Finger Tapping (FT) test. **(C)** Based on participant's self-reported handedness (*n* = 113: 98 right, 12 left, and 3 ambidextrous).

14, 17, 29, 31) loading heavily onto factor 2 (in brown; Table 1). Additionally, among the new items, item 22 loaded only onto factor 1 and items 15, 19, 20, 25, 28, and 32 loaded only onto factor 2. Table 1 also shows that "combing hair" almost equally loaded onto both factors, and, from all the items, "eating an apple" appeared to have the lowest loading onto both factors.

Performance Measures Correlated Better with the New Items Than with Each Other

Next, the Pearson's correlation matrix was computed between items of Dragovic's questionnaire (7), new items (25), the total questionnaire (7+25) and the three performance measures, along with the two-factor scores obtained from factor analysis. The degree of correlation between GPT, FT and the Dynamometer test with the seven items from Dragovic, new items, and the questionnaire combining all the items appeared to be stronger compared to the degree of correlation among themselves (Figure 3B). To test the significance of this correlational difference in within-performance measures and between-performance measures and new items, Fisher's Z statistical tests were performed to compare correlation coefficients (criteria used: dependent, overlapping groups; one-sided). Statistical analysis

Table 1. Factor loadings obtained from the two-factor exploratory factor analysis solution using varimax rotation (*n* = 113). The first 7-items are from Dragovic's questionnaire (in blue) and the rest are the additional new items. A cut of value of 0.3 was used when interpreting the loadings (in red) and items were considered to load heavily if the difference between the two loadings were >.1. Yellow and brown show items that load heavily onto factor 1 and 2 respectively; black for low loadings and green for similar loadings.

Questionnaire Items	Factor 1 Loadings	Factor 2 Loadings
1. Throwing a ball	0.72	0.44
2. Using scissors	0.81	0.36
3. Writing	0.88	0.21
4. Eating with a spoon	0.81	0.23
5. Brushing teeth	0.83	0.41
6. Cutting with a knife without fork	0.8	0.35
7. Striking a match (hand that holds the matchstick)	0.72	0.36
8. Pulling the cord on a ceiling fan light	0.33	0.5
9. Plugging a charger earphone cord into a phone (hand that holds the cord)	0.42	0.33
10. Putting a poster on the pinboard hand that holds the pin	0.7	0.43
11. Combing hair	0.58	0.52
12. Using a TV remote	0.4	0.64
13. Pouring a pitcher in a glass on the table	0.72	0.44
14. Holding a cellphone camera while taking a selfie photo with one hand	0.41	0.52
15. Removing hair stuck on a comb or brush (hand that picks hair)	0.21	0.52
16. Washing a plate with a sponge (hand that holds the sponge not plate)	0.63	0.44
17. Putting a USB drive into a desktop	0.32	0.59
18. Holding a pencil eraser when erasing on the paper	0.79	0.31
19. Petting an animal	0.23	0.7
20. Holding the end of scotch tape when tearing it	0.25	0.42
21. Eating an apple	0.3	0.36
22. Using a computer mouse	0.39	0.28
23. Unlocking a padlock (hand that holds the key)	0.72	0.48
24. Unscrewing the lid of a jar	0.41	0.51
25. Turning a page in a book (hand that turns the page, not that holds the book)	0.11	0.41
26. Using a razor putting on makeup	0.78	0.38
27. Dealing cards (hand that distributes card)	0.46	0.58
28. Holding a cellphone to ear during a casual phone call	0.22	0.57
29. Putting a coat on (hand that goes in first)	0.3	0.45
30. Stirring a pot while cooking	0.61	0.41
31. Holding a cup while drinking	0.33	0.46
32. Opening a drawer	0.21	0.72

showed Dynamometer-new items correlation to be higher than Dynamometer-GPT correlation (p = .004) and Dynamometer-FT correlation (p = .002), as well as FT-new items correlation to be higher than FT-Dynamometer correlation (p = .004) and FT-GPT correlation (p = .02), the rest being non-significant ($p \geqslant .2$). The correlation plot also showed that although Dragovic's questionnaire correlated better with the GPT, the 32-item questionnaire showed a stronger correlation with FT and Dynamometer compared to that of Dragovic's (Figure 3B). Next, since among the three performance measures Dynamometer showed the highest correlation with the new items (Figure 3B), pairwise t-tests were performed in order to assess whether Dynamometer LQ

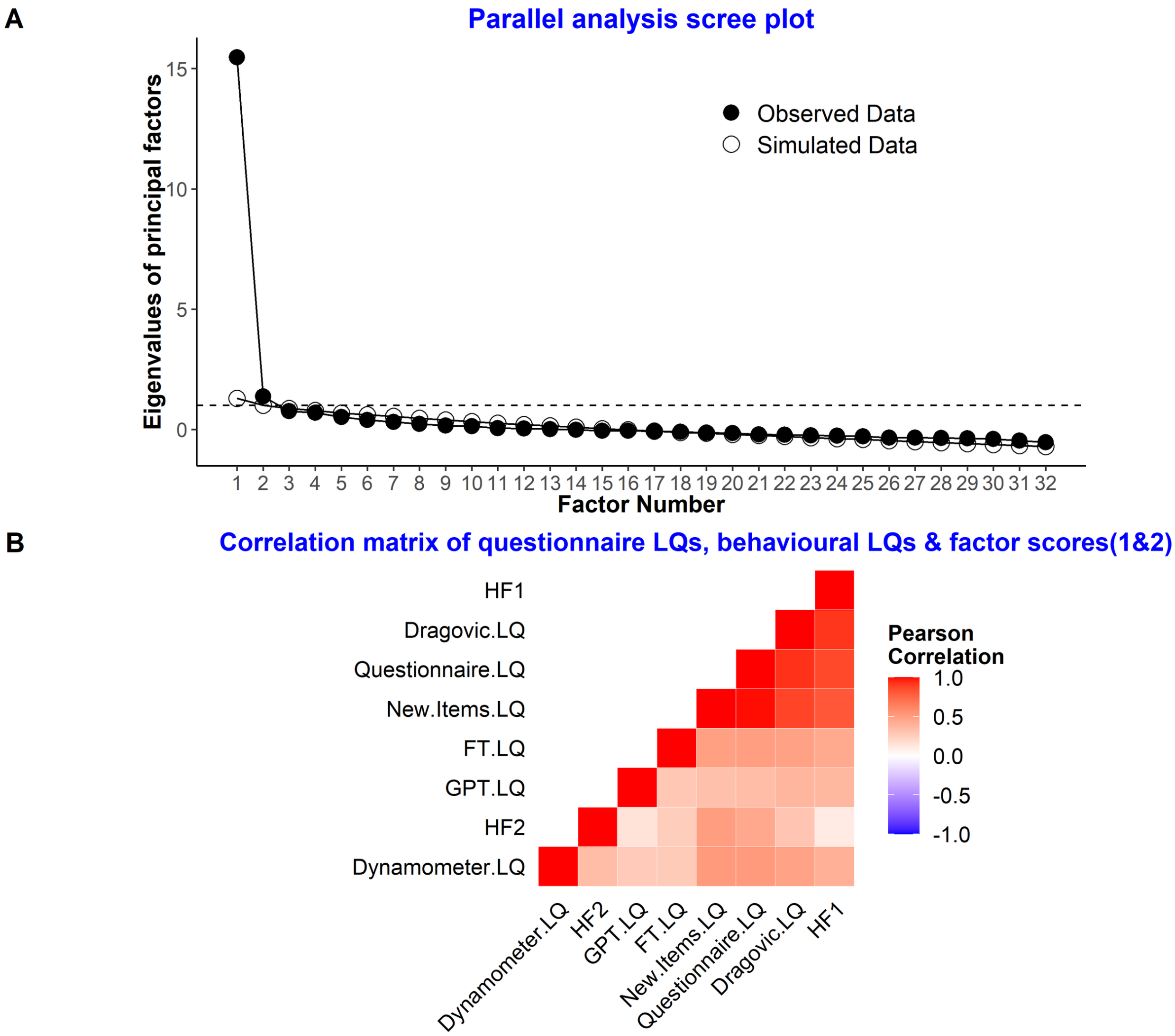

Figure 3. (A) Presence of two factors on the scree plot obtained from parallel analysis performed on the questionnaire. **(B)** Correlation plot between items: LQs from Dragovic's questionnaire (7), new items (25), questionnaire combining all the items (32), Grooved Pegboard Test (GPT), Finger Tapping (FT) test, Dynamometer, handedness factor 1 scores (HF1) and handedness factor 2 scores (HF2). *n* = 108 for FT and 113 for the rest.

significantly differs from that of FT and GPT. Pairwise t-tests (Bonferroni correction) on performance LQs showed the mean difference between GPT and FT (p = .023, paired) and Dynamometer and FT (p = .078, paired) were significant, with a non-significant difference between Dynamometer and GPT (p = 1.00, paired). All preference and performance measures displayed a stronger correlation with handedness factor 1 scores (HF1) than 2 (HF2; Figure 3B).

Discussion

The purpose of this project was to build a questionnaire to quantify mixed-handedness along with right- and left-handedness accurately and examine the correlation between the new items, Dragovic's 7 items, and the three different performance measures (GPT, FT, and Dynamometer).

The new items and the questionnaire both seem to categorize mixed-handed individuals more sensitively than Dragovic's questionnaire, putting them in the less strongly right-handed group (Figure 1). The LQs from Dragovic's questionnaire appear to "force" individuals to the one extreme of handedness (left or right). This makes sense as the purpose of the modified EHI was to "prevent unjustifiable categorization of individuals with otherwise clear right-hand preferences into the mixed category" (Dragovic & Milenkovic, 2013), hence the limited variability. However, the purpose here is not to classify people into categories, but rather to generate a fine-grained quantitative estimate of the degree of handedness. Combining the Dragovic items with the new items provides a middle ground by generating a broad spectrum of possible degrees of handedness that correlate with performance measures. Although our results are promising, a sample containing a higher number of ambidextrous/left-handed people and people of different demographics is needed to establish that with more certainty.

While the performance measures quantify right-handed people quite accurately, they fail to do so in most cases for the left- and mixed-handed population (Figure 2). Because of this variability, using any of these performance measures alone will not categorize individuals with precision; however, combining them might prove useful as suggested by Corey et al. (2001). The two-factor solution generated from EFA shows Dragovic's seven items loading mostly onto factor 1, with the new items distributed between factors 1 and 2. Although the underlying construct that all these items measure is handedness, some items contribute more to one factor than the other. Dragovic's items loading heavily onto factor 1 might indicate that the first factor is taking explicit handedness into account, whereas the second factor may account for more subtle variability related to the extent to which the preferred hand is favoured exclusively. For example, items such as "using a computer mouse", "holding a pencil eraser..", "using a razor..", which loaded onto factor 1, require a stronger degree of manual skill compared to items such as "using a tv remote", "holding a cellphone to ear...", "petting an animal", "opening a drawer", which loaded onto factor 2 (Table 1). This notion is supported by the finding that hand preference for "skilled" activities (requiring use/manipulation of tools/objects) is strongly lateralized and hence may load onto one factor, whereas "less skilled" activities (picking up objects) load onto another (Steenhuis & Bryden, 1989). In future studies, it could be interesting to see how each of these constructs ("skilled & less skilled") correlate with a range of tasks known to impact lateralization (e.g., language, intelligence).

Traditionally, a factor loading of 0.3 is used as a cut-off, as a factorability of 0.3 indicates that approximately 10% of the relationships within the data are accounted for by that factor (Williams et al., 2012). Following this, all the items exceed the cut-off generously in at least one of the two factors. The only item with a poor loading on both factors is “eating an apple.” Therefore, the elimination of this item would likely increase the construct validity of the questionnaire (Table 1, in black). The correlational plot portrays an interesting finding: the correlation between the new items and the performance measures is stronger than the intercorrelation between these performance measures, which was statistically found to be true only in the case of Dynamometer and FT. This finding aligns with another study by Brown et al., (2006) which suggested that the reason for this could be that all three performance measures tap into different motor abilities which possibly don’t correlate well (e.g. motor speed VS visuomotor control). Hence, it is important to combine preference measures with the performance ones to tap into different constructs of laterality. The higher correlation of dynamometer LQ out of all three performance measures with new items LQ presented the question of whether performance LQs significantly differ from each other. According to the analysis, a significant difference is present between Dynamometer and FT and GPT and FT, but not Dynamometer and GPT. This could be due to the dichotomous nature of hand performance measures and a sample consisting mostly of right-handed individuals.

The broad range provided by the addition of new items to the modified EHI developed by Milenkovic and Dragovic (2013) allows the appropriate characterization of mixed-handedness and opens new possibilities in the field of handedness research. In future studies, the correlation between various components that are measured by the hand performance tasks and the questionnaire items should be studied. Additionally, the correlation of these performance and preference measures with other measures of lateralized abilities could be examined, including language processing (left hemisphere advantage) and spatial attention (right hemisphere advantage), to see whether certain items/performance tests correlate more with these tests and explore why that might be the case.

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Appendix

Appendix A. Handedness Questionnaire Used in this Study.
A combination of 7 Dragovic's items+ new 25 items), as per Gonzales and Nelson (2019), Cohen (2008), Strien (2002) and Milenkovic and Dragovic (2013).

HANDEDNESS QUESTIONNAIRE

Participant ID: ____ Date: _______-_____-_____

YYYY - MM - DD

Experimenters: ____ Study Number: ________

For each of the following activities, please check one of the 5 possibilities:

- Always Prefer Left
- Usually Prefer Left
- No Preference
- Usually Prefer Right
- Always Prefer Right

Task/Object	Always Left	Usually Left	No Preference	Usually Right	Always Right
1. Throwing a ball					
2. Pulling the cord on a ceiling fan/light					
3. Plugging a charger/earphone cord into a phone (hand that holds the cord)					
4. Putting a poster on a pinboard (hand that holds the pin)					
5. Striking a match (hand that holds the matchstick)					
6. Combing hair					
7. Using a TV remote					
8. Pouring a pitcher into a glass on the table (hand that holds the pitcher)					
9. Using scissors					
10. Holding a cellphone/camera while taking a selfie/photo with one hand					
11. Removing hair stuck on a comb or brush (hand that picks hair)					
12. Writing					
13. Washing a plate with a sponge (hand that holds the sponge, not the plate)					
14. Putting a USB drive into a desktop					
15. Holding a pencil eraser when erasing on paper					
16. Petting an animal					
17. Holding the end of scotch tape when tearing it					
18. Eating an apple					
19. Using a computer mouse					
20. Unlocking a padlock (hand that holds the key)					
21. Scratching your right elbow					
22. Unscrewing the lid of a jar (hand that turns the lid)					
23. Cutting with a knife (without fork)					
24. Turning a page in a book (hand that turns the page, not that holds the book)					
25. Using a razor/putting on makeup					
26. Dealing cards (hand that distributes card)					
27. Holding a cellphone to ear during a casual phone call					
28. Putting a coat on (hand that goes in first)					
29. Stirring a pot while cooking					
30. Brushing teeth					
31. Holding a cup while drinking					
32. Eating with a spoon					
33. Opening a drawer					

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